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THE PRESIDENT PICKS A TELEPHONE MAN FOR A GIGANTIC JOB

All branches of the telephone industry feel gratified that President Hoover selected one of its representatives—Walter S. Gifford—to lead the organization which the national government plans for relieving the unemployment situation during the coming months. All things considered, this appointment is regarded as vitally important as any the President has made, not excepting cabinet officers and foreign ambassadors.

Mr. Gifford's selection is looked upon as a recognition of exceptional business ability, and also—which is, perhaps, more important—of a broad sympathy and humane public spirit that is not always found in the spokesmen of so-called Big Business.

The press comments on Mr. Gifford's appointment have been universally favorable. They have demonstrated that he is regarded as a business leader who can be trusted to guard the rights and needs of the average man. That, in itself, is a tribute which many a representative of Big Business would give a great deal to receive.

* * * *

In an informal address at Salem, Mass., last November, Mr. Gifford expressed personal opinions on business ethics that now have greater significance in view of the important mission to which President Hoover has called him. At that time he had no idea of handling the tremendous work recently committed to him by the White House, but one thing he then said shows the direction of his thinking. Here it is:

"The opportunity for everyone having all they want, almost—at any rate, having well-being for all—is not a Utopian dream at all. There was a time when the only way one people got wealthy was by conquering another one. There was a time when the only way one man made money was by taking it from somebody else.

The new idea of industry, as I see it, is that there is enough to go around if we can only work out the intricate and difficult problem of having it go around right, and work out the difficult problem of seeing that our prosperity is prosperity for all, just as our education is education for all and our politics is democratic."

* * * *

This principle makes a good foundation for a platform that aims toward the establishment of a "Live and let live" policy in the American business and industrial world. Mr. Gifford elaborated the idea further, one notable sentence putting it bluntly: "I think the day of the hog in business is passing."

The telephone field is interested in these opinions because in the past it has suffered from a disregard of the theory that there is "enough to go around." It is not so many years ago that Independent telephone interests were engaged in a savage hand-to-hand competitive struggle with the Bell System, whose chief now advocates ideas which are so totally different.

The policy of cooperative effort between the two telephone groups, which has been in force in recent years, has proved successful, and it is the main reason why the telephone is in a much more favorable position than the other public utilities are today when there is so much agitation and pressure to "get after" public service companies and subject them to political punishment.

In his own business Mr. Gifford has found that cooperation and fair play are essential, and his arguments should be heeded by all other industries.

* * * *

An interesting feature of the discussion of the President's move to bring relief to those suffering from the depression is the belief expressed that from it will come results that will mark some real progress in general welfare. The prominent business leaders, representing all industries and all sections of the country, who have been called to this task, are expected not only to raise millions for the immediate needs of the unemployed, but also to reorganize industry so that such crises will not be repeated.

It may seem like a far-fetched dream to induce hard-boiled business to acknowledge—and fulfill—its social obligations to the masses, but since 1929 many thoughtful industrial leaders have been converted to the idea that for their own protection they must consider more their responsibilities to their neighbors and not devote all of their attention to their own profits.

* * * *

One economic writer, who has always opposed government ownership of indus-

try, and even very much government regulation of business, now says:

"There must be reasonable limitations upon the rights of property. Those who contend that such limitations are unthinkable are fostering a policy that will end in destructive revolt. Uncontrolled business today would be no less dangerous to civilization than a plan whereby the ownership and control of business would be vested in the state.

With human nature as it is there is no safety for our country unless the profit-making motive is subjected to wise regulation. The desire to make money must be made subordinate to such principles as those which underlie compulsory education, employes' liability measures, factory acts, honest banking practices, law observance and the preservation of public morals and public health."

That quotation is from Floyd W. Parsons' article on "What Price Humanity?"

The principles he mentions are in the interest of public welfare. One Chicago editor put the case in concrete terms when he said that Mr. Gifford "looks upon business as an engine of public usefulness, not as a mere device for plunder and profit."

An effective way for service companies to meet the anti-utility campaign is to show the public that they are usually doing more than their share in the payment of local taxes. Right now high taxes is a vexed question in nearly every community, and the less said about it the better the politicians—the tax-eaters—are pleased. The fact remains that the critics of the utilities seldom give them credit for what they contribute towards running the government.

COMING CONVENTIONS.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 20, 21, 22 and 23.

Illinois Telephone Association, Pere Marquette Hotel, Peoria, November 18 and 19.

Utility Taxes.

From the United Telephone Co., of St. Marys, W. Va., TELEPHONY has received a copy of an editorial that appeared in the Pleasants County Leader, published at St. Marys, which presents this issue in a square, candid fashion. It says:

* * * *

"Whether in proportion to earnings is beside the fact that the utility corporations do pay taxes—and big taxes. It is the mistaken idea of the masses that these corporations do not pay taxes. Now, in Pleasants county the railroads, pipe-lines, gas companies, telephone, telegraph and electric power companies pay taxes on a valuation of $2,576,659.

This valuation of the public utility property is $292,594 greater than all of the individual personal property in Pleasants county, and only $959,746 less than the total value of all the real estate in the county.

Nor does the direct taxes on this considerable valuation end their paying. After this there are license taxes, gross sales taxes, income taxes, excess profits taxes, etc., etc. If the 'bowed down' individual thinks the corporations do not pay almost to the point of 'through the nose,' he has another think coming."

The United Telephone Co. is sending out reprints of this editorial to all its subscribers, which is a good idea and one that should combat the claim that the utilities are milking the public.

* * * *

The tax situation in most communities would be infinitely worse were it not for the revenues supplied by local service companies. For instance, payment of police and fire department salaries in Chicago last month was made possible only after the Illinois Bell Telephone Co. had come to the rescue by sending the city a franchise compensation check for $4,759,000.

Fundamentals of Acoustics in Telephony

Recent Advances in Study of Acoustics—Velocity, Transmission, Absorption and Reflection of Sound—Methods of Calculating Reverberation Time and Reducting Its Effects in Auditoriums, Studios and Telephone Set Locations

By Arthur L. Albert,

Assistant Professor of Electrical Engineering, Oregon State College, Corvallis, Ore.

In the final analysis, telephony is the science of transferring sound variations from one point to another by electrical means. The sounds from the speaker strike the diaphragm of the transmitter where they are converted into electrical impulses. These electrical impules are then transmitted to the distant receiver where they are converted back into corresponding sound variations, and are heard by the listening party.

It is apparent that the success of any telephone communicating system depends upon the acoustic devices (transmitters and receivers) which convert the sound waves into electrical current variations, and then change these back into sound waves.

Even if these devices are properly designed and constructed, their functioning is, however, greatly influenced by the acoustic conditions of the room in which they are installed. Furthermore, telephone engineers are often called upon to install radio microphones for remote control work, and frequently are required to arrange group address systems. All these, and many other factors, unite in requiring that telephone engineers should become familiar with the fundamental principles of acoustics.

The scientific study of acoustics is of rather recent origin. Credit is due Professor W. C. Sabine who, about the beginning of this century, placed acoustics on a scientific basis. His original works[1] are regarded as an outstanding contribution. Sabine's work has been checked and extended by others, and especially in the field of architectural acoustics, much progress has been made.[2]

The advent of radio, group address systems, and especially sound moving pictures, have all united in demanding improved acoustical conditions, and have stimulated research in this field. As a result, in the last two or three years many contributions have been made. It is the purpose of this article to explain the fundamental principles of acoustics, which will be of interest to those concerned with supplying telephone service, and to provide a background with which they can continue the study.

There are two very closely related, but distinct meanings of the word "sound." One of these is that sound is a sensation produced by the organs of hearing. The other is that sound is a purely physical phenomenon consisting of a wave motion

[1] Sabine, W. C.: "Collected Papers on Acoustics," Harvard University Press.

[2] Watson, F. R.: "Acoustics of Buildings," John Wiley & Sons.

in the air or in other sound-conducting media. In this article, sound will be considered from this last viewpoint; that is, as a physical phenomenon.

From this physical standpoint, sound is a wave motion consisting of a train of condensations and rarefactions produced in the transmitting medium by a vibrating body. The illustration of a vibrating tuning fork radiating sound waves is, no doubt, familiar to all.

Medium.	Velocity (Feet per sec.)
Air (one atmosphere pressure, O°C.)	1088
Water (15°C.)	4714
Pine (along fiber)	10900
Copper (20°C.)	11670
Steel	16360

Table. No. 1. Velocity of Sound in Several Media Different in Character.

It is sometimes convenient and even desirable to consider sound waves as existing only in air since most of the sound energy from a vibrating source passes to the ear in this manner. There are times, especially when studying machine noises and the acoustic design of buildings, when this viewpoint would lead to a misunderstanding. Sound waves should, therefore, be considered as consisting of condensations and rarefactions traveling in any medium.

Sound waves serve to transfer a certain amount of energy from the vibrating body to the ear. As the vibrating object moves, it produces corresponding motions in the air particles adjacent to it. When it moves toward the air particles, it forces them together causing an increase in air pressure or a condensation. When it moves away, it produces a decrease in pressure or a rarefaction. These moving particles in turn transmit their motion to adjacent particles and in this way sound is propagated.

The Velocity of Sound.

The condensations and rarefactions comprising the sound waves travel through a medium with a definite velocity, depending on the type of medium and its physical condition. In fact, as Table No. 1 shows, these velocities are greatly different. It is quite evident that in a gas the velocity is very low as compared with the velocity in a solid such as steel.

These velocities are easily calculated by the methods set forth in most books on physics. The velocity of sound for a given medium varies greatly with the temperature, and for a gaseous medium also varies with the pressure.

How Sound Is Transmitted.

In considering sound phenomena, it is very important to remember that sound waves carry energy from the source to the ear. There is, therefore, a certain amount of energy in the air in the form of sound. When sound waves are once produced, they continue to travel outward from the source until their energy is absorbed and they die out, or until they are reflected by some object. There are, accordingly, three factors to consider: transmission, absorption, and reflection.

The first of these factors, transmission, has already been discussed. It was shown that sound impulses were transmitted either in a gas or a solid by causing a series of condensations and rarefactions in the medium to travel away from the vibrating source. In traveling through a medium some sound energy is absorbed through friction between particles, but this is usually only a small amount of the total absorption. Most absorption of sound energy is caused by absorbing materials rather than in the transmitting medium.

As an illustration of this absorption, suppose that a sound is produced in a room heavily carpeted and provided with draped walls. When the sound waves strike the floor and walls, the energy that the waves contain is largely dissipated in heat in the small air spaces between the fibers of the coverings. If it were not for these coverings, the sound energy would be almost completely reflected when a wave struck a wall or floor, and would continue to be reflected about the room until it slowly died out.

These three factors, transmission, reflection, and absorption, can be illustrated by Fig. 1. If the wall is massive and does not vibrate as a whole with "diaphragm" motion, and if the surface is smooth such as plaster or wood presents, almost all of the energy will be reflected as indicated.

If now the wall is covered with some sound-absorbing material, such as a heavy cloth or hairfelt, much of the energy will be absorbed at the surface and the reflected wave will be very weak. In either event, the amount of sound transmitted through the wall will be small, unless the wall is not rigid and vibrated as a whole.

Acoustic Defects of Rooms.

It was mentioned that when a sound wave encounters a wall or other object, part of the energy was reflected, part absorbed, and part was transmitted. This reflected sound is responsible for most of the acoustic defects of rooms, and may cause either interfering *echoes* or excessive *reverberation*.

An echo becomes apparent to a listener only when the distance from the source to the reflecting surface is of such magnitude that the interval of time between reception directly from the source and indirectly from the reflecting surface is appreciable. Troublesome echoes, therefore, usually only occur in large rooms. Echoes can be greatly reduced by changing the form of a reflecting surface so that the sound is scattered, or by covering the surface with sound absorbing material. The last method is usually by far more practicable.

Excessive reverberation is caused by a lack of sound-absorbing material in a room. Almost everyone has observed the great change in the sound characteristics of a room caused by the removal of the furniture, rugs and curtains. When a sound is emitted in such a room, the waves are reflected about by the walls, floor, and ceiling, and may persist for a considerable period.

If a sound continues to be audible for several seconds after the source has been discontinued, a room is said to have a high reverberation time. Such rooms are often termed "live" rooms, while those having a very short period are termed "dead" rooms. Reverberation time is probably the most important of all acoustic considerations.

In the past many futile attempts were made to improve the acoustics of rooms and auditoriums. One of the favorite methods was to string many feet (or even miles) of fine wire about the room, usually near the ceiling. Just what this was supposed to do has never been clearly understood. The actual effect of such wires was, of course, nil.

Sabine was the first investigator to determine quantitatively the actual reason and remedy for excessive reverberation. He showed that if sufficient absorbing material was introduced into a room, the reverberation time would be reduced to the desired value. He also studied materials very extensively, and determined the coefficient of absorption for many building and absorbing materials.

His basis for expressing the absorption coefficient of a material is interesting. Suppose that a room contains a window one foot square. When a sound wave strikes this window it will, theoretically, all pass out through the window, and as far as the room is concerned at least, this sound energy will all be "absorbed." Sabine assumed an open window to have an absorption coefficient of unity, and expressed all materials with respect to it.

The sound-absorbing coefficients of a number of common materials and objects

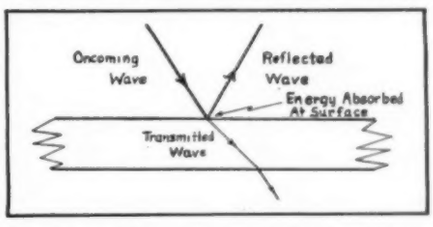

Fig. 1. Approximate Conditions When Sound Wave Strikes Wall.

are shown in Table No. 2. A more detailed list can be found in the references listed.[2, 3] The values listed in the table are only typical; it is apparent that wide variations may be expected.

Calculation of Reverberation Time.

Although more accurate methods have been developed,[4] the reverberation time of a room or an auditorium can be roughly

[3]Bureau of Standards, Circular No. 380, "Architectural Acoustics," U. S. Printing Office.

obtained by a simple procedure. If a note is loudly blown with some musical instrument (for example, a cornet), and if the time that the sound persists after the source is discontinued is measured with a stop watch, this measured value will be approximately the reverberation time of the room. It is usually different for different frequencies, as the sound-absorbing coefficient of a material varies somewhat with frequency.

After considerable experimentation, Sabine developed the expression $T = 0.05\,V/a$ for calculating the reverberation time. In this expression, T is the time in seconds from the instant the source is discontinued until the decaying sound becomes inaudible, V is the volume of the room in cubic feet, and a is the total sound-absorbing power of the room. The ease with which the reverberation time can be determined before a room is even constructed is illustrated by the following example.

Suppose that a small auditorium containing 500 upholstered seats has a volume of 150,000 cubic feet, and that its inside surface consists of 8,000 square feet of plaster, 6,000 square feet of wood, 400 square feet of glass, and 200 square feet of ventilator space. The calculations would be as follows:

Material.	Size (sq. ft.)	Co-efficient.	Total Absorption Units
Plaster ...	8,000	0.034	272
Wood	6,000	0.030	180
Glass	400	0.030	12
Vents	200	0.750	150
Seats	500	2.300	1,150
Total			1,764

With these constants, the reverberation time would be $0.05 \times 150{,}000/1764 = 4.26$ seconds, a value far too high for good results.

The calculations just made were for an empty auditorium. Suppose that it is desired to know the reverberation time with 400 seated people present. The audience would greatly increase the total absorption by the value $400 \times (4.7-2.3) = 960$ units. The 2.3 subtracts the value of the seats occupied. The reverberation time would then be $0.05 \times 150{,}000/(960+1764) = 2.75$ seconds.

Although the reverberation time has been reduced by the presence of the audience, it is still too high and must be further reduced by the addition of such furnishings as carpets and wall hangings, or by the addition of sound-absorbing material to the walls or ceilings, whichever a study shows to be the most economical and desirable.

It has been mentioned several times that the value of reverberation was too high. The question immediately arises: What is the optimum reverberation time? This has been the object of many studies and these have been summarized and extended in a recent paper,[5] from which Fig. 2 has been redrawn.

A recent investigation[6] has shown that while Sabine's formula seemed satisfactory for rooms and auditoriums which were "live"; for example, having a reverberation time of about a second, this formula does not apply to "dead" rooms, such as broadcast studios.

A general formula applying to all types of rooms under conditions of normal sound energy diffusion is derived in the paper just mentioned and shown to be

$$T = \frac{0.05\,V}{S \log_e (1-\alpha_a)}$$

Where V is the volume of the room in cubic feet, S is the total room surface in square feet, and α_a is the average absorbing coefficient obtained by adding together the products of each different surface area and its corresponding absorption coefficient, and dividing by the total room surface area.

Material.	Absorbing Coefficient per sq. ft.
Open window	1.00
Concrete	0.015
Glass	0.03
Plaster	0.034
Wood (varnished)	0.03
Vents	0.75
Objects.	**Units Absorption**
Audience (per person).	4.7
Seats (upholstered) ...	2.3

Table No. 2. Sound-Absorbing Coefficient at 512 Cycles Per Second.

Group Address Systems.

The preceding discussion of reverberation in auditoriums is one which concerns telephone engineers as they are often called upon to provide group address systems for large audiences.

Such a system may be used to amplify a program originating locally—that is, by a speaker in the auditorium—or it may be for amplifying a program being received by either radio or line transmission. In any event, the best group address system manufactured can not produce satisfactory results in an auditorium having an improper reverberation time, or in a room having undesirable echoes. With a knowledge of the fundamentals as set forth in the previous section, such faults can usually be corrected.

There are a number of excellent group address systems on the market today, and when all factors are considered, their cost is remarkably low. Even though an auditorium may be acoustically correct, a speaker may not be able to speak loudly enough to be heard in all parts of a room. Such a condition can only be improved by sound amplification with a group address system. Sounding boards and such devices over or behind a speaker are of little value.

Reverberation of Studios.

It was mentioned that studios were usually highly-damped acoustically and were, therefore, termed "dead." It was also brought out that Sabine's formula must be modified for such rooms.

With the growing tendency for radio broadcast companies to locate their studios in the heart of a city, and have their transmitting station outside the congested area, telephone companies are being contacted for connecting facilities. Again the acoustic problem is confronted, for no matter how good the transmission characteristics of the connecting circuit, the broadcasted program will be poor if the acoustics of the studio are not good.

A very interesting article[7] on the acoustics of studios appeared recently and is recommended to those interested in this subject. The author of this article brings out the fact that the microphone is (contrasted with the human ear) a non-selecting device, picking up all sounds in proportion to their relative strengths, rather than concentrating on those desired. He also mentions that an address can be made from an acoustically-treated booth with excellent results, and discusses the accepted sizes of studios for orchestras.

Room Noises and Telephone Locations.

The amount of noise present in the room in which a telephone is located has a very great effect upon the success of a telephone conversation. These noises interfere with the telephone user by direct action through his idle ear, and also by side tone through the transmitter and receiver. Room noises add to induced line noises, thus tending to render telephone conversation difficult.

Within the past few months considerable attention has been focused on this phase and a number of papers[8, 9, 10] have been prepared stating the test procedure and the results obtained. The results of these sur-

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[4]Wente, E. C., and Bedell, E. H.: "A Chronographic Method of Measuring Reverberation Time." Jl. of Acoustical Soc. of America, Vol. 1, No. 3, Part 1, PP. 422-427, April, 1930; also Bell System Reprint No. B500.

[5]MacNair, Walter A.: "Optimum Reverberation Time for Auditoriums," Jl. of Acoustical Soc. of America, Vol. 1, No. 2, Part 1, PP. 242-248, January, 1930; also Bell System Reprint No. B466.

[6]Eyring, Carl F.: "Reverberation Time in 'Dead' Rooms," Jl. of Acoustical Soc. of America, Vol. 1, No. 2, Part I, PP. 217-241, January, 1930; also Bell System Reprint No. B465.

[7]Voorhees, L. E.: "Acoustics of Radio Broadcasting Studios," Journal of American Institute of Elec. Engrs., March, 1930, Vol. XLIX, No. 3.

[8]Williams, W. J., and McCurdy, Ralph G.: "A Survey of Room Noises in Telephone Locations," Transactions of the Am. Institute of Elec. Engrs., Vol. 49, PP. 1393-1399, October, 1930; also Bell System Reprint No. B526.

[9]Galt, Roger H.: "Results of Noise Surveys," Part 1, Noise Out-of-Doors, Journal of Acoustical Soc. of America, Vol. II, PP. 30-58, July, 1930; also Bell System Reprint No. B506.

[10]Tucker, Rexford S.: "Results of Noise Surveys," Part II, Noise in Buildings, Journal of Acoustical Soc. of America, Vol. II, PP. 59-64, July, 1930; also Bell System Reprint No. B507.

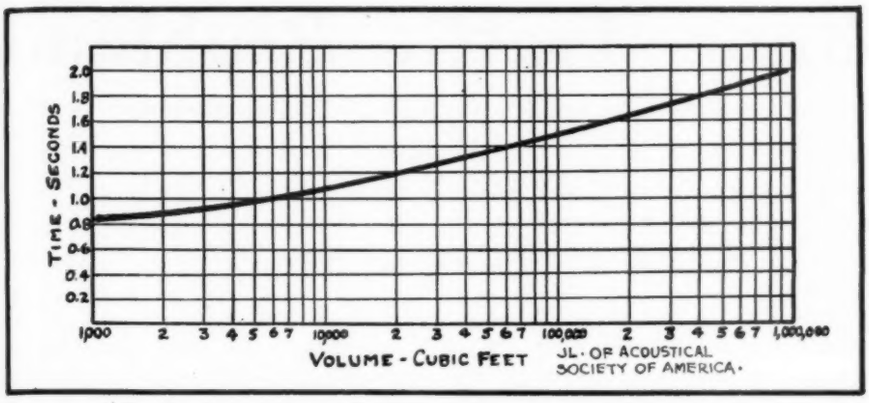


Fig. 2. Optimum Reverberation Time for Auditoriums, 512 Cycles Per Second.

veys will undoubtedly have an effect on telephone engineering, especially in demanding the use of a telephone subset which produces less side tone without a marked decrease in power output.

Conclusions.

In this brief article, the fundamental factors of acoustics of greatest interest to telephone men have been brought out. No attempt has been made to give a detailed account of the many applications.

A few references to current literature of an understandable and readable nature have been given. These in turn give references which will further enlarge the field. The reader is encouraged to consult these references, and is assured that his curiosity will be well repaid.

Service Improvement Gives Time to Second in New York.

Since August 1 New Yorkers who call MEridian 7-1212 for the time have been able to set their timepieces to the second, instead of to the half-minute as was formerly the case. This is due to a new method of giving time information through announcements and signals every 15 seconds which was introduced by the New York Telephone Co.

Under the new plan, there is no change in the method of reaching the telephone time bureau over that in use during the last three years. The inquirer calls MEridian 7-1212 as formerly, and simply listens to receive the exact time. It is not necessary to ask the time-announcing operators for the time; in fact the equipment is so arranged that it will not be possible for these operators to hear any questions asked them.

The time announcement is made every 15 seconds, the announcers saying for example: "When you hear the next signal, the time will be two-fifteen and one-quarter." These words will be followed by a high-pitched tone, automatically produced, marking the time to the exact second. With the time so frequently reported, the company points out that a caller who may fail to understand an announcement will need only to listen for the next one.

The voices of operators selected for this work are tested to meet unusual standards. By the use of lever keys an operator, guided by a volume indicator, may raise or lower the transmission level of her voice.

Time inquiries in New York City have reached a daily average of above 50,000 calls in the busy months of the year, or more than four times the average in the first weeks of the service in 1928.

The time service equipment is regulated from the United States Naval Observatory at Washington, D. C., through a "grand master" clock in the Western Union building in Manhattan and two "master" clocks in the telephone company's bureau. These two clocks control duplicate sets of announcing equipment, provided to insure continuity of service. Both sets are housed in a turret on the face of which are the signal lamps and indicators which guide the operators.

One set of indicators, with faces similar to the mileage register on an automobile, records the time in 15-second steps. At a fixed interval before each quarter-minute change, a green signal lights, and the operator makes her announcement. The tone signal, known scientifically as a "short thousand-cycle tone," follows her announcement with carefully-regulated precision "to the second."

A white signal light indicates whether any inquirer is connected with the bureau. Although during most of the day this signal will remain constantly lighted and announcements will be continuous, there will be brief periods, particularly during the night, when no announcements will be required. If one set of equipment fails for any reason, a red signal light will inform the operators, so that they may instantly transfer to the other without interruption.

What Operators Want to Know

Qualifications to Consider in Selecting Operators—Avoid Getting Misfit Into Your Organization—She Causes Chief Operator Worry and Annoyance—It Is Easier to Hire Than to Fire

By Mrs. Mayme Workman,
Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

Did you ever visit a telephone exchange and pick out an operator who is a misfit—a girl who is lacking in some of the most necessary qualifications that should be considered in selecting a girl for telephone work?

What is the result of having a misfit in your organization? First of all, your service will suffer, as a misfit will not take the proper interest in her work. She will not or can not carry an operator's load. She causes the chief operator constant annoyance and worry.

In the larger companies, more thought is given each year to the selection of employes. The day when you could get a job because you were Jenny Lee's sister or Mary Brown's niece is passed. Today, you must meet the requirements that are considered essential to make a good telephone operator. If you meet all of these requirements, you must pass a strict medical examination before you are employed by these companies.

In selecting a girl for telephone work, keep in mind that in selecting employes you have a responsibility to your customers, your company and your operators. If you are careful in choosing your girls and it develops that a girl you have selected does not meet the necessary requirements after you have given her a fair trial, explain the condition to her in as kindly a manner as possible. Explain to her that because she is not the type who will make a success in telephone work is no reason why she cannot be very successful in some other line of work.

Always remember, it is easier to hire than fire. Read the answers to question No. 5 and make a note of this information for future reference if you are responsible for the selection of employes in your office.

Questions from Illinois Operators.

1. Do you handle a call differently when a subscriber asks you to hurry or rush a call?
2. In the case of a collect call, who clears the circuit?
3. When you pass a call to your toll center and she tells you the circuits are busy, and she does not ask you to hold the trunk and the calling number, why can you not put another call on this circuit?
4. If a subscriber places a call and tells you he does not wish a report and that he does not wish to pay a report charge, are we permitted not to give him a report and not to charge a report charge if a chargeable report is received?
5. What does it require to make a good operator?

For answers to these questions from real Illinois operators, turn to page 45.

Some Telephone Traffic Problems

Employment and Training of Operators in Small Exchanges—Special Services in Small Communities—Discussion of Toll Traffic Problems—Paper Read at Southern District Meeting of United States Association at High Point, N. C.

By Roy F. Mapes,

Chairman, Traffic Division, United States Independent Telephone Association

There is usually a sufficient number of intelligent, courteous, young women of good character and pleasing personality in every community who need to work and who can be employed at reasonable wages, providing working conditions are what they should be.

Physical examinations, although desirable and justified in some cases, are not so important as apparent general adaptability for telephone work. In most cases, the student operator must secure the necessary fundamentals from the experienced operator whose place she is to take. Where conditions make this impossible, she must either receive her preliminary training from an experienced chief operator or operator from another exchange or from the manager as a last resort.

Urges Reading of Traffic Articles.

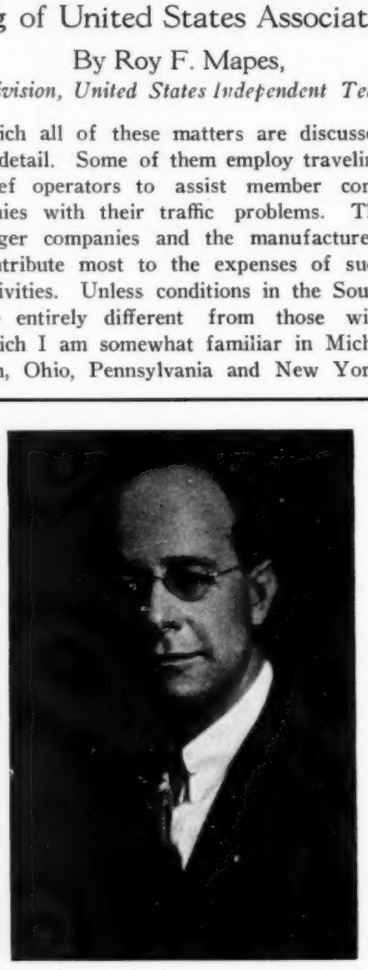
In any case, she should be provided with two books on standard operating practices —one for local and one for toll. If the exchange is not provided with them, they can be purchased through the national association. Much authentic and valuable information can be obtained from reading traffic articles in TELEPHONY and the Telephone Engineer. The farther back she reads and the more traffic papers she studies the better operator she will become.

Each office should be provided with at least one copy each week. They should be read, filed and read again. If this is followed by a correspondence course in long distance operating, the rest of her training and supervision will be comparatively easy. These remarks apply to the smallest office. From this point we will work up.

Employment and Training of Operators.

If the company has several exchanges in a group, the employment, training and supervision of operators in the smaller exchanges should be handled by the chief operator at the largest exchange. Companies with 25 or more exchanges should have at least one experienced chief operator who can spend most or all of her time on this work. Her salary and expenses will be more than justified by the quality and amount of local and toll service rendered by her operators. Good service brings more subscribers and more toll calls, a higher percentage of calls completed and more net revenues at the end of the year.

State associations have been and are now rendering a wonderful service to Independent companies by holding meetings at which all of these matters are discussed in detail. Some of them employ traveling chief operators to assist member companies with their traffic problems. The larger companies and the manufacturers contribute most to the expenses of such activities. Unless conditions in the South are entirely different from those with which I am somewhat familiar in Michigan, Ohio, Pennsylvania and New York, the latest and best operating methods are passed along from the largest companies to the smallest.



Mr. Mapes, Traffic Superintendent of the Jamestown Telephone Corp., Jamestown, N. Y., Discusses a Number of Questions of Interest to Traffic People and Managers.

Local conditions and policies of management will determine the type and quality of the local service. I agree with the one who wrote me that "companies operating about the same number of stations should exchange information and help each other for the common good of all." This is one of the surest and most economical ways in which to solve the problems of employment, training and supervision of traffic employes.

At this point, I wish to testify to the constructive thinking and generous cooperation which the manufacturers have given to Independent companies in helping them to solve their traffic problems. Of course, they are anxious to sell equipment but they furnish solutions to many perplexing service complications and usually can show companies how to increase revenues and net profits. Consult their representatives, get advice from different manufacturers, then decide what to do in your territory. They will not "load you up" with equipment which you do not need and cannot pay for.

Equipment, personnel and operating methods which will produce satisfactory local service will enable an Independent telephone company to handle short-haul and long-haul toll business which is a good revenue producer and which also adds to the prestige of the local company and the community which it serves.

There is a wide divergence of opinion among telephone men and women as to the necessity for and extent to which companies should attempt to furnish information and special services which, although desired, are not expected in the cities and larger towns. If the subscribers and the general public have, over a period of years, become accustomed to unlimited information as to the location of fires, arrival and departure of trains, weather reports, location of doctors, etc., considerable courage and diplomacy are necessary if any or all of these practices are to be discontinued.

Only one of these problems was mentioned specifically in the replies which I received from my letters to executives in this district, asking what problems I should discuss. That was in regard to fire calls where the town has no fire-alarm system and depends entirely on the telephone. I am familiar with this situation which is quite common in territories served by Independent companies, even in large towns, small cities and even some quite large cities.

Handling Fire Calls.

The best arrangement for manual exchanges without paid firemen on duty at all hours day and night—one which is in satisfactory use in several places—is to have the town purchase and install an electric motor siren with a switch in the operating room and a private business telephone at the fire headquarters. When a party reports a fire, the operator rings the telephone at fire headquarters, then throws the switch and starts the siren. Someone will reach headquarters inside one minute, stop the siren and answer the telephone. The calling party tells this man where the fire is and any necessary particulars.

The operator stays in on the connection until the man at fire headquarters gets the necessary information. She even tells him where the fire is if the calling party hangs up or gets excited and does not handle the call properly. As soon as the location of the fire is known, someone at fire headquarters starts the siren again. This time the blasts are coded to designate the ward in which the fire is located.

This whole procedure takes only a few minutes, definitely locates the fire and calls the volunteer firemen to headquarters or to the actual location of the fire. Subscribers and the general public are educated by the town officials and the telephone company not to call central for the location of the fire and the operators are instructed not to attempt to give out this information. This cuts the number of calls in connection with the fire down to a minimum and makes it possible to handle all necessary calls during this period in a satisfactory manner.

With automatic telephones, the operator is out of the picture but the calling party dials fire headquarters and starts the siren automatically, waits for a reply, locates the fire and the rest of the program is much the same as with manual equipment. The conditions under which special services are expected, requested and furnished differ so widely, as between communities and companies, that I shall not attempt to express my views on all of them.

I will state that I am in favor of furnishing no more of these special services than are absolutely necessary to maintain good public relations which every company, large or small, should have. Again, I say, consult the Independent manufacturers and they will help you to work out solutions to all of your special service problems, whether they be local or toll and regardless of the size of exchanges or territory served.

Toll Traffic Problems.

The plant problems of the nation-wide toll service program have been described by A. L. Stadermann, chairman of the plant division. He has shown you the necessity of high standards for plant engineering, construction, operation and maintenance. The "Value of Toll Lines to Independents" was thoroughly demonstrated by R. F. Wilder at the national convention in Chicago last October. His excellent analysis of this subject, with conclusions and recommendations as chairman of the commercial division, was printed in full in TELEPHONY of October 18, 1930.

Other phases of this all-important subject by well qualified representatives of the Bell System have also been made available to you. For those who have not heard or read these discussions, as well as for those who read them once, I recommend that you refer to these issues of TELEPHONY as soon as you return home:

The "General Switching Plan for Toll Service" by H. S. Osborne, transmission engineer, American Telephone & Telegraph Co., was explained in the issue of October 4, 1930. "This Illinois Telephone Business of Ours" by Paul J. Ramsey, general manager, state area, Illinois Bell Telephone Co., appeared January 3, 1931.

All four of these articles contain much authentic detailed information which Independent telephone executives should read in order to visualize the program as a whole and formulate their own company toll-service program.

Telephone men and women have, during the last few years, witnessed remarkable achievements in the art of long distance communications. By utilizing radio and other recent developments, we now have trans-continental and trans-oceanic service, also service to and from moving trains and ships at sea. Within the last few months, a newspaper man in an airplane high over New York City carried on a satisfactory experimental conversation with his headquarters, using radio and regular telephone lines.

On a recent Sunday afternoon, I sat in my own home listening to a radio program, when there was a slight interruption, and to my amazement I heard conversations between an announcer on Submarine "O-4" and another announcer on another submarine, the "O-8," which were two miles apart, 10 miles out in Long Island Sound, 350 miles from Jamestown. One of the submarines submerged 38 feet but there was no interruption to the conversation.

Quoting from TELEPHONY of March 22, 1930, "Unquestionably the telephone will assume greater importance on the sea and in the air until the time comes when anyone, anywhere, on land, on sea or in the air, will be able to talk to anyone else, anywhere at any time—by telephone!" These predictions are being fulfilled much faster than most people realize.

There are people at this meeting who could testify to the wonderful progress that has been made, and is being made every day in improving the mechanical equipment of various types, which is now available to all telephone companies, and the high standards of mechanical operating efficiency which have been attained by some companies. These same people could also tell you of companies which, for various reasons, have not taken advantage of these improved mechanical facilities.

As a general rule, the companies with the most up-to-date equipment and personnel have the respect and goodwill of their customers and are more secure from the standpoint of dividends today and in the years to come.

The high standards which have been set, and in numerous cases realized, by those responsible for plant department engineering, construction, operation and maintenance—together with the almost unlimited and ever-increasing demands from the telephone-using public—have imposed upon the traffic departments of all companies the obligation to establish, attain and maintain correspondingly high and continually-rising standards for local and long-distance service.

Whether the plant and equipment be up-to-date and adequate to meet the requirements of present day local, national and even international demands or several years behind the times, when measured by generally-recognized standards, the personnel and operating methods of the traffic department should, so far as possible, fit into the nation-wide toll-service program.

Millions of dollars have been spent by the Bell and larger Independent companies for toll lines and toll equipment. With but few exceptions their standard toll operating practices cover every conceivable condition that may arise. Any intelligent man or woman can understand and learn to use them. I hope that all companies represented at this southern district meeting are using standard toll operating practices at all exchanges.

Local exchange service standards for Independent telephone companies are determined somewhat by local conditions and the extent to which the subscribers demand improvements and conveniences to which their relatives and friends in the larger cities or communities have become accustomed.

The type of equipment, methods of operation and quality of local service, however, depend almost entirely upon the vision, initiative, courage, executive ability and perseverance of one man or a small group of men. They are the heads of the telephone companies serving these communities. The local exchange service is just what these men consider necessary and sufficiently remunerative.

These statements apply also to local toll service between exchanges in the territories served by these companies, especially if they own the lines between these exchanges.

If these men are satisfied with inferior plant and equipment and operating methods which the larger and more progressive companies have discarded, not much atten-

The Unusual in Telephone Work!

TELEPHONY is desirous of securing photographs of the unusual in telephone work in the United States. Snapshots of unusual bits of construction, unusual or unique switchboards or subscriber set installations, unusual tools or equipment and unusual men or women—all combine to form "The Unusual in Telephone Work."

Send in photographs of any of these unusual things for they will make an interesting page in TELEPHONY. They should be sent within the next few weeks, before October 1.

tion will be given to the traffic department unless it becomes necessary for their state public service commission to check them up. In every such case which has come to my attention, the management has immediately recognized the importance of a higher grade of service and become interested in traffic problems.

With few exceptions, the companies that have established enviable reputations have been guided by men who devoted plenty of their time to the traffic department, employed only capable superintendents and chief operators and helped them to meet service requirements.

Long-distance service reaches beyond the boundary lines of companies, states and nations. Although the larger portion of toll calls handled by any exchange, Bell or Independent, large or small, might be classed as "short distance," many exchanges have calls every day to and from other states and some have calls that involve transcontinental and even transoceanic circuits.

With automobiles and airplanes traveling everywhere and with the occasional emergencies, delays and accidents that occur, almost any Independent exchange is liable to be called upon to handle calls to places which even a year ago would not have been considered possible. There will be calls to and from moving trains, ships and airplanes.

Even if the exchange plant and equipment is not sufficiently modernized to handle such calls from the first subscriber's station available, the patron will go to some other station or even to the central office but he should not be disappointed with long delays, careless or inefficient operating or poor transmission. The Bell companies have provided, and construction budgets approved for 1931 and future years will add, facilities to handle telephone calls which are brought to their toll centers.

In order, therefore, to meet present-day requirements, every Independent telephone company should, if it has not already done so, make a survey of its plants and check up on its traffic personnel and methods. There must be close, harmonious cooperation and co-ordination between the plant and traffic departments and between companies. There have been in the past, are now and will be in the future, many problems to work out.

Getting back to the nation-wide toll-service program, please bear in mind that the Bell System toll-switching plan toward which the Bell companies have been building for several years will be in full operation, in its major essentials, in 1931. This provides eight regional centers in the United States, all inter-connected with high-efficiency direct circuits. These regional centers all have primary and secondary outlets. This southern district is provided with one regional center at Atlanta and at least 36 primary outlets. Some of you are nearer Dallas, St. Louis and New York.

From the new A. T. & T. "Toll Rate and Route Guide," which became effective May 1, I have determined that there are 486 toll centers in this Southern district. Many of these toll centers are owned and operated by Independent companies. Obviously, each toll center must and should have a sufficient number of well-trained and properly-supervised toll operators and they should all use standard toll operating practices. Operators at the smaller tributaries will not ticket and time toll calls but they also should be familiar with these standard practices.

Tributary operators, if properly trained, can handle calls to the toll center and to other tributaries of the same toll center. Supervision by the tributary operator is of utmost importance. If she is alone with a one or two-position board and is handling local, rural and toll calls all at the same time, she must be clever and tactful to satisfy everybody. If the commercial relations and plant conditions are such that she does not have to sort the toll calls to determine who can talk and who can not, she can render a better grade of service to all by connecting her party to the recording operator at the toll center.

The toll center operator will make the ticket, establish connection with the called party, time the call and complete the entire transaction. The tributary operator, however, must give whatever supervision is necessary to assist the operator at the toll center and she must take down the connection instantly her party hangs up.

If the tributary office is magneto, closer supervision by the tributary operator is necessary, otherwise subscribers who do not ring off and those who do will be overcharged. Subscribers on magneto exchanges must be trained to ring off when through talking on all connections so that they will form this habit and ring off when through on toll calls, both short-haul and long-haul.

This brings me to the problems of supervision and service observation which are absolutely necessary in order to know what grade of service is being rendered and what steps should be taken to correct non-standard conditions, especially operating practices. There are various mechanical arrangements by the use of which traffic superintendents and chief operators may know whether their operating force and those of connecting companies are "tending to business" or not.

Supervision and Service Observation.

There are also many other items of information that cannot be secured without the proper kind of supervisors, supervision and observation. Not all Independent companies can afford to spend the money for complete service observation equipment and specially trained observers to secure the necessary traffic data.

Toll centers should develop a sufficient number of supervisors from their regular force. Length of service is not always the most important requisite. The chief operator should train them to fit into their proper places in the company organization plan. A few of them can be further trained to observe and correct errors.

Representatives of the Independent manufacturers and those of the Bell operating group will gladly assist with suggestions based on their experience. It does not matter whether your equipment is manual or automatic, service observation, supervision and good central office management will help you to solve all of your traffic problems.

In conclusion, let me again impress upon those highest in authority and responsibility with each of our Independent companies, the necessity of high standards for traffic personnel and operating methods, together with absolute cooperation and coordination between departments and companies. The proper combination of these factors will produce satisfactory service to your patrons and dividends to your stockholders.

FOUR FACTS

Successful management means directing this business so that it operates at profit; otherwise everyone in it from the bottom to the top would finally be without jobs.

Successful management also must include satisfied customers. This necessitates a fair price and the best possible quality that can be put in our service.

Successful management consistently aims to cause every executive and employe in the organization to realize opportunity for the profitable use of his or her ability.

The management of our organization daily strives to fulfill these three purposes and appreciates the cooperation of each member to that end.—W. N. McAnge, Jr., President, Intermountain Telephone Co., Bristol, Tenn.

England's New System in Timing Transoceanic Calls.

The British Post Office announces a new departure for users of the radio-telephone services to Argentina, Australia, Brazil, Canada, Chile, Cuba, Mexico, New Zealand, Uruguay, the United States, and to ships at sea.

In booking a call any subscriber may in future ask for the call to be limited to three or more minutes as he wishes, and the London trunk exchange will terminate the connection as soon as the caller has had the specified period of effective conversation, unless he asks for an extension.

If the caller does not fully use the time for which he has asked, he will be charged only for the effective time actually used, subject to the usual minimum of three minutes.

Here and There in Telephone Work

"I Wonder Why" of an Observing, Traveling Telephone Engineer.

By Ray Blain

I wonder why it seems so difficult for some people to say "Good Morning" when they come on the job ready to start their day's labor.

I have worked in offices where everyone came to work in the morning with a cheerful greeting for one another and it just seemed to start the day off right. I have worked in others where if anyone was spoken to early in the morning, he would reply grudgingly with a strained grunt, not nearly as cheerful as would be emitted by a contented pig. I have also noted that more and better work was performed in the office where the cheerful exchange of greetings started off the day, and the labor turnover was considerably less.

I have noticed also that big executives never have any difficulty giving everyone from the janitor up a cheerful morning greeting. I wonder if it could be possible that people who are not capable of greeting their co-workers cheerfully in the morning never get to be big executives?

P. B. X. Current Supply; Maintenance of Storage Battery (Ctd.).

By John A. Bracken.

The observance of certain precautions in the maintenance of P. B. X. storage batteries will greatly assist in making their operation satisfactory, and prolong their period of useful service. A very important precaution is regular inspection of the battery and related equipment.

When inspecting the P. B. X. storage battery, the repairman should check for the following:

1. Cells firmly secured in place.
2. Connections tight and clean.
3. Corroded terminals and wire connections caused by acid on top of cells due to overfilling, or too loose plugs causing flooding.
4. Acid on top of cell covers, causing current leakage.
5. Condition of plates and separators.
6. Electrolyte tests to the correct specific gravity.
7. Electrolyte at proper level within each cell. When inspecting other than glass type cells to see whether or not they contain enough electrolyte, a flashlight should be used. Open lights or flames should never be used for this purpose, as the hydrogen gas generated when the battery is charging is very inflammable of itself and highly explosive when mixed with proper proportions of oxygen in the air, and an explosion may result.
8. High temperature at terminals and connections.

SLEEVES

By "Buck."

They've got some little double tubes of iron or copper, by gum. They call em' "Sleeves"—pore durn boobs! They put 'em out in sheaves an' tell us that we gotta use these sleeves fer each durn splice. Fergittin' to, they won't excuse. It wouldn't be so nice to git discovered splicin' wires without these goldurned things. That sure would stir the dad-gummed fires o' wrath an' rage, by Jinks!

It useta be that we could make our splices as we wished. This durn sleeve stuff shore takes the cake. I don't see why they dished it up fer us. Why can't we just go on a-twisting' 'em? Some day I know I'm gonna bust! Their new idee is bum!

You'd think it was a lotta skin right off the boss's nose to have some sleeveless splices in our plant instead o' those with durned newfangled tubes. What diff'rence does it make if we jes' twist the wires? They ain't too stiff.

By Heck! It seems to me that all these sleeves is good fer sir, 's a perch fer purty poll, or else a double-barrel fer a shot-gun fer a doll!

9. Partial short-circuits or grounds in the wiring to the battery.

10. Short-circuits within a cell. A short-circuited cell is indicated by the marked difference in color of the plates as compared with the other cells composing the battery group. Other indications of a short-circuited cell are low capacity, low specific gravity, excessive heating and evaporation of the electrolyte.

If the cause of the short-circuit cannot be located by the eye, it may be found by discharging the battery at the normal rate through a suitable resistance. As the discharge progresses, the E. M. F. will gradually decrease and it should be frequently read at the battery terminals. As soon as it shows a sudden drop, the E. M. F. of each cell should be read with a low scale voltmeter.

While the readings are being taken, the discharge rate should be kept constant and the discharge continued until the E. M. F. of the majority of the cells reads 1.70 volts. Those reading less should be noted. The discharge should be followed by a normal charge until the cells which read 1.70 volts are up to 2.5 volts, then the low reading or short-circuited cells should be cut out, examined, and the trouble remedied.

11. Excessive current drawn from the battery. Inasmuch as the current drain by the P. B. X. switchboard operator's transmitter circuit is an appreciable amount for the smaller size storage batteries used in a single position switchboard, the attendant should be requested to keep all unused talking keys in their normal position; that is, all keys should be unoperated as much as possible when not actually engaged in conversation.

12. Cracked or broken battery jar. If a jar should become cracked or broken, the plates should not be allowed to become dry. If there is no extra jar on hand, the plates should be removed, either with or without its jar, from the circuit and immersed in a wooden pail or glass vessel filled with water until ready to reinstall in a new battery jar.

13. Gassing of cells under charge. If a cell fails to gas while charging or to give off a fine spray, there is something wrong with it and it should receive immediate attention.

14. Height of sediment in bottom of glass jars cells. Examine for this by means of a flashlight held behind the cell and looking through from the front between the top of the sediment and bottom of the plates.

The interval during the hours of maximum discharge of the battery is the time when the greatest expansion of active material in the plates takes place, and it is at this time that the active material is more liable to fall from the plate grids. Most of the deposited sediment in the bottom of the cell is, therefore, active material which is in a discharged condition. This sediment has no part in the subsequent charges and discharges of the battery. Therefore, the electrolyte never quite comes back to its proper density.

If not removed, after a time this sedi-

ment will accumulate to such a depth as to touch and bury the lower edges of the plates, causing the cell to be short-circuited. The accumulation of this sediment must be watched carefully and removed (if practicable) when the clearance has been reduced to ½ an inch between the bottom of the plates and top of the sediment. Very often it will be found that the depth is greatest under the middle plates, and if the sediment is leveled over the bottom of the cell its removal will not be necessary for some time longer.

To remove the sediment, the simplest method—provided the battery has bolted connections between the cells and the jar unsealed at the top—is, after fully charging the battery, to lift the plates out of the jar without disturbing the wood separators to avoid breakage (they become very tender after being subjected to the action of the acid). Draw off or pour off the electrolyte carefully into a glass vessel, dump the sediment, clean and rinse the battery jar with fresh clean water; then replace the plates and immediately cover with the old electrolyte, adding enough new (of the same specific gravity as the old) to replace that lost by displacement by the removal of the sediment.

The plates must not be exposed to the air except for the shortest possible time, and not allowed to dry out in the least. For this reason only one cell should be emptied, cleaned and refilled at a time.

If the cell connections are burned together, the sediment can be removed by using a special form of scoop, made of hard rubber or wood, containing no metal in its construction, so designed as to be drawn beneath the plates in the cell and then removing the sediment from the jar. The wood separators, if the plates are thus equipped, should be temporarily drawn up, so as not to interfere with the movement of the scoop.

Another method is to draw off the electrolyte from the cell and flush with water in such a manner that the sediment will be continually stirred up and at the same time washed out. Immediately after the cells are cleaned, the plates and electrolyte replaced, as described, the battery should be given a long charge, continuing until every cell is fully charged, when the specific gravity of each cell should be taken and, if necessary, adjusted to standard specific gravity.

In maintaining a P. B. X. storage battery of coverless type glass cells the question, "Is it proper to pour oil on the electrolyte, and will it prevent spraying of acid?" is occasionally asked. It is not good practice under any circumstances, or for any purpose, to use oil in a storage cell. The spraying or gassing during charge is a perfectly natural action of the cell, and any attempt to stop it will result in injury to the battery.

If at any time the spraying or gassing of the P. B. X. storage cell is objectionable, proper ventilation should be provided. Good ventilation is very important during charge, not only to prevent explosive mixtures of gases collecting in the battery cabinet or special battery room, as the case may be, but also to prevent undue depreciation of the equipment and impairment of insulation the ventilation should be sufficient to keep the tops of the battery cells, the racks, wiring, etc., dry.

In general, the ventilation system inlet area should be approximately double the area of the outlet, and both should be sufficiently large to give satisfactory ventilation during the summer season. The inlet and outlet ventilating dimensions depend on the size of the battery, and cabinet or room, and on the difference between the temperatures of the air in the cabinet or the room and of the outside air.

In cases of large P. B. X. switchboard installations in which a special room is provided for the battery-supporting rack and storage cells, the ventilating inlets should be placed just above the floor, and in the ceiling at the opposite end of the room the outlet flue. The outlet flue should be of lead or of brick set in pitch, and should, if possible, be extended several feet above the roof of the building. The opening should be protected from rain and snow by some suitable device.

With this method of ventilation, the air from the adjoining rooms passes through the inlets located at or near the floor level, then circulates around the storage battery and up to the ceiling where it passes through the outlet flue to the top of the building. When it is found that natural ventilation is not sufficient, a heating coil in the outlet flue will obtain the desired results.

P. B. X. BATTERY RECORD

SUBSCRIBER	TEL. NO.
ADDRESS	
DATE OF INSTALLATION	
NUMBER OF CELLS	TYPE
LOCATION OF BATTERY ON PREMISES	
DISCRIPTION OF CHARGING EQUIPMENT	

FRONT OF CARD

TROUBLE AND INSPECTION REPORT

CELL NO.	HEIGHT OF ELECTROLYTE	SPECIFIC GRAVITY	TROUBLE FOUND	DISCRIPTION OF WORK PERFORMED TO CLEAR TROUBLE.	TIME	DATE	BY

REAR OF CARD

Battery Inspection Report Form Card of the 4-Inch by 6-Inch Size.

Women's Diplomacy Results in Cancelling Take-Out Order.

A. Ballard, manager of the Miltonvale (Kans.) Telephone & Telegraph Co., has gone on a cash basis in collecting telephone rentals and only lost five subscribers. Mr. Ballard tells two interesting experiences in connection with this change in collection policy of his company.

Upon calling at one home to take out an instrument, Mr. Ballard found the women inside crying. One of the women, addressing the man of the house, said: "To think of a man who chews as much tobacco as you do denying his family telephone service." The take-out order was cancelled.

At another place the man said that he had paid for that telephone 20 years and declared that someone else could pay for it now. His wife listened quietly to the tirade and when Mr. Ballard was ready to start removing the instrument, she said, "John, you have smoked that pipe for 20 years, too, so if the telephone comes out, you stop smoking and throw that pipe away." Again the telephone remained.

Large Southern Cities Connected by Additional Long Lines.

The increasing usage of long distance telephone facilities has made necessary the construction of two new direct long distance circuits between Atlanta, Ga., and Birmingham, Ala.

These two lines bring the total connecting these cities up to 15. There is a greater volume of long distance calls between Atlanta and Birmingham than between any other two large cities in the South.

Telephone Development in Shanghai

History of Telephone Service in Shanghai, China—System Now Operated by International Corporation—Work Under Way on Conversion to Automatic of Entire System in Shanghai as Described in Recent Issue of The Realty Market

The first established telephone service in Shanghai was conducted by the China-Japan Telephone Co. in 1881 and that company carried on until 1899, when a meeting of subscribers took place to solve difficulties which had arisen in the local service. The outcome was the formation of the Shanghai Mutual Telephone Company, Ltd., with a capital of 100,000 taels (about $80,000).

The new exchange was opened on August 1, 1900, with 107 subscribers and was established at the corner of Shantung and Hankow roads. Better premises were available shortly after and the exchange was moved and installed on a 10 years' lease at 14 Hankow road.

The Bubbling Well exchange was the second to open, in 1901, but it was later replaced by the Western exchange at the corner of Carter road. In 1902 the company purchased for 140,000 taels ($1,120,000) a site at the junction of Hankow and Kiangse roads, and built its present central exchange.

In 1904 subscribers rapidly increased and, apart from the necessity of a larger exchange, the question arose as to which system was the best for Shanghai. Common battery was most popular in Europe and America until the automatic made its appearance. The general manager was obliged to make an extensive tour abroad to study the different telephone systems. The year 1905 saw the capital of the company raised to one million taels ($8,000,000) and in 1908 a franchise agreement was definitely fixed.

In 1908 the present central exchange building of five floors in Kiangse road was completed and was reputed to be the first reinforced concrete structure of such a size in Shanghai. It was extremely well built and has changed very little to date. This building is now occupied by the headquarters' staff, in addition to housing a 10,000-line automatic exchange and retaining in service some 50 per cent of the old 10,000 line manual exchange.

In 1912 the eastern exchange at Yangtszepoo was opened and the manual system was used until its replacement in 1924 by Ericsson's automatic system (1,000 lines).

On account of the war in 1914-18, the delay in deliveries of materials ordered from Europe and consequent lack of new instruments put a stop to further extensions, and were it not that some equipment arrived from America, the congestion in service would have been very serious.

In 1924 the 1,000-line Ericsson automatic exchange was inaugurated, this being the first automatic exchange in Shanghai. Owing to the inexperience of subscribers many difficulties arose. The company had to carry out a house-to-house visitation in order to familiarize the subscribers in handling the new instruments.

In 1925, after many years of negotiations with the Chinese government telephone administration, the long distance and general service to Nanking, Soochow, Wusih, etc., was opened up. The capital of the company was again increased, this time to 2,500,000 taels ($20,000,000). To meet the steady demand for additional telephones, it was necessary to install a new exchange on Edinburg road, now known as the Lucerne exchange, also exchanges on Route Pichon and Fokien roads.

The traffic congestion, inseparable from the involved interworking of systems at this stage of development became a subject of strong public comment. As a result the Shanghai Mutual company in 1929 invited an expert from the British General Post Office to come to Shanghai to investigate the whole system.

The outcome of this report was that a large amount of capital was required at once for further extensions and it was thereafter decided to sell the company. As a result, it is now owned and operated by the International Telegraph & Telephone Corp. The new company is doing all that is possible to convert the entire Shanghai system to automatic within two years.

We now come to the program of what the new Shanghai Telephone Co. means to do. The Shanghai Telephone Co., a subsidiary of the International Telephone & Telegraph Corp. took over control of the Shanghai Mutual Telephone Co., Ltd., and paid or took over liabilities to the approximate amount of 10 million taels ($80,000,000). A 40-year franchise agreement was granted by the councils of the international settlement and French concessions, the agreement being signed on August 5, 1930. One of the conditions of this agreement was to the effect that the company convert the entire telephone system in Shanghai to automatic working within two years.

This means a great task ahead for the company, and before the work of conversion to automatic can be completed, it will be necessary to erect seven new buildings to house automatic equipment, divert many of the wires so as to redistribute the subscribers' lines and redivide the total area into nine districts instead of seven, estimate the growth and lay new cables to make a much larger system. Incidentally it will be necessary to take out a good many cables in order to draw larger cables into the ducts, which will entail much labor.

Of the seven new buildings that are being constructed for the installation of automatic equipment, Pichon, Fokien, and Wayside are almost completed; North, West and Montigny are well under way.

The Pichon exchange is constructed to house 10,000 subscribers' lines and at present 4,000 lines are being installed. Montigny is built to hold an ultimate capacity of 20,000 subscribers' lines. At first, equipment sufficient for the lines of 6,000 subscribers will be installed. These two exchanges will serve the French concession, and have a total capacity for 30,000 subscribers' lines.

Fokien exchange is one of the principal buildings in the new system, and is constructed to hold an ultimate capacity of 20,000 subscribers' lines. This building is at present housing the engineering plant and part of the traffic offices.

Wayside exchange will cover the whole of the eastern district which is at present being served by the East exchange, and part of the northern area. The existing East exchange will be dismantled to preserve the unity of the automatic system and to place the exchange in the correct location.

The word humidity needs no explanation for one who has lived through a Shanghai summer. Everyone knows what high humidity means in terms of personal comfort, but some perhaps do not know that telephone apparatus feels this discomfort too and, not being human, expresses its discomfort by refusing to work. Humidity breaks down the efficiency of the telephones, and the company, in order to safeguard the service of the subscriber, provides means whereby this feature is eliminated from the rooms in which the automatic switches are used. The Carrier type of air conditioning is being installed in all exchanges.

TO BE A GOOD BOSS.

If you aspire to be a boss, you have to be a good servant. If you have been through the ranks yourself, you understand what it means to be a good servant, and you will not have any trouble being a boss when the time comes. Your men will follow you. You won't have to drive them.

Intelligence is all that is needed, and every normal person has a fair amount of that.—James A. McCulloh, president, New York Telephone Co.

The company plans to divide the area into nine districts and automatic equipment now being installed will be for 43,000 lines. It will be so constructed that without redistribution the structure can grow to 125,000 lines and additions to other buildings and subdivisions of areas can carry the total to a very much larger number.

Before the system is completely automatic, the company has to lay over 170 miles of new cable and splice about 70,000 miles of wires in these cables, involving 5,000 cable splices. It is necessary to engage a large number of new employes to do this work and many of these are already employed and are being trained by experts in the company's training school. Approximately 2,000,000 wire splices have to be made, over 33,000 subscribers' telephones changed to the new system, nearly 1,000 switchboards changed or altered and 2,000 poles removed from the streets of the city of Shanghai.

The company is doing its best during this reconstruction period to continue the service and give the best possible satisfaction with the existing plant. The International Telephone & Telegraph Corp. has brought a number of its experts to Shanghai to assist the local company. These men came from various European countries, England, the United States and South America, and are looking after all phases of the work (not only the construction) of the various departments in cooperation with the original staff of the old company.

It is the company's aim, when all the work at present in hand is in operation, to give Shanghai an up-to-date local telephone service equal to any in the world.

Proper Posture Is Important to Health

The Body Must Be Carried in Proper and Well-Balanced Position to Allow Every Organ to Function Unhampered—Body Should Be Erect With Head Held High, Chin In and Chest Elevated—Published by Courtesy of Telephone Talk

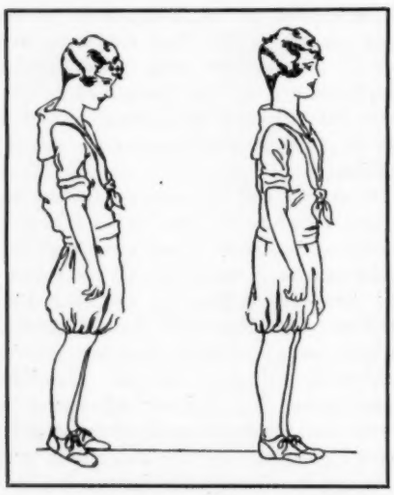
By Miss K. S. Perrin,

Health Supervisor, British Columbia Telephone Co., Vancouver, B. C., Can.

Considering the fact that much time, money and effort are being directed toward the enhancing of physical charms—if in doubt as to the truth of this, dip into any of the many current magazines, run through their advertising pages and be convinced—it is strange, indeed, that more stress is not placed upon the correct use and proper carriage of the body as being perhaps the most important influence upon the development of real and enduring beauty.

True, every eye forms its own ideal of what constitutes "beauty." There may easily be wide divergencies of taste regarding coloring or stature, but surely all are of one mind in admiring that poise and grace of movement that goes with good posture.

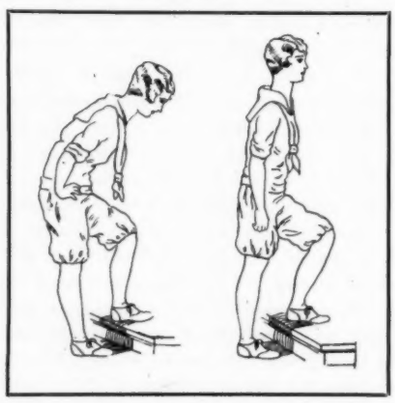
How we thrill at the sight of a sail boat skimming the waters, canvas unfurled, yet under perfect control, or of a spirited steed responsive to his rider's every wish!



Incorrect and Correct Standing Posture. The Feet Should Be Parallel, Toes Pointing Straight Forward. Stand "Tall" as if Hung by the Top of the Head.

We are ready enough to lose ourselves in admiration of any feat well performed, yet at the same time are content with our own clumsy and unskilled handling of the greatest of nature's great gifts—namely, the human body.

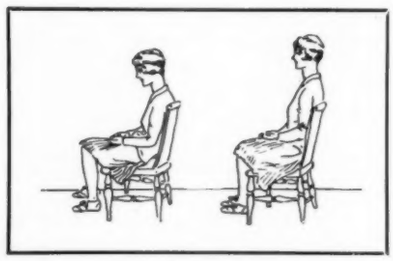
Just gaze upon the passer-by on any of our city streets and behold to what



Wrong and Right Posture in Ascending Stairs. Climb "Tall."

lengths, widths, and unnatural curvatures of the spine the human form has been driven! A vistor from some other sphere would find no easy task in deciding just what the normal figure should be.

Whereas correct posture is no cure-all for every pain or discomfort that may assail us, nor is it a guarantee against the contraction of illnesses, yet it is a strong factor in the maintaining of a high state of health. By relieving the nervous, muscular, skeletal and organic systems of unnecessary strain, it increases the body's natural resistance against disease. By releasing the energy that would be used in keeping an improperly balanced body from falling, good posture opens the way to a life of greater power, pleasure and usefulness.



For Correct Sitting Posture, Push the Lower Spine Well Back in the Chair and Then Lean Back. Do Not Slide Down in the Chair, Sit "Tall."

Much bodily fatigue, nervous exhaustion,, anaemia and organic disturbances, such as headache, indigestion and constipation, result from, or at least are aggravated by, an improperly balanced body.

The first step in the development of good posture should very naturally be taken by the feet—the foundation upon which the entire structure stands. Those greatly sinned-against members should be placed in a straight-ahead position lying parallel one to the other; and remember, should there be any deviation from the straight and narrow path, let it be an inward rather than an outward turning. The body weight should be carried along the outer margin of the feet and not upon the great toe joint.

Contract the muscles of the lower abdomen, tense the muscles of the buttocks, straighten out the curves of the back, and now, with head held high, chin in and chest elevated, the body is in a position which allows its every organ unhampered working conditions.

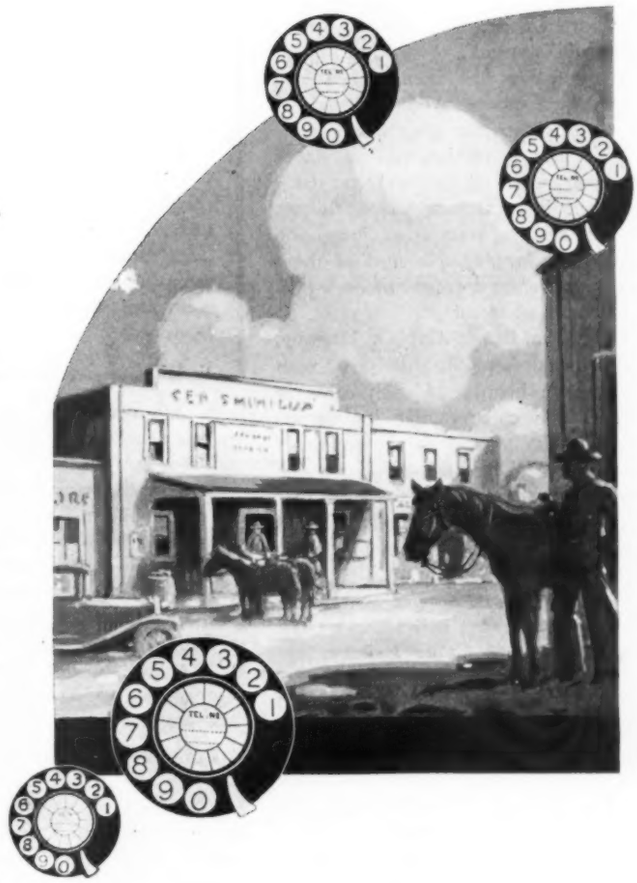
Good posture or good body mechanics give us grace, freedom of movement and additional mental alertness. Let us make the most of ourselves. If we are short, let us stand "tall"; and if tall, all the more reason why we should stand "tall."

Operating Organization "Goes Automatic"

Telephone Company of San Antonio, Texas, has
d Strowger Automatic Dial equipment for several
indicated in the accompanying illustration. This
many operating organizations which, after thor-
complete analysis of existing dial networks, have
Automatic Dial operation is the most satisfac-
solution to the small exchange problem.

wger success are not hard to find. In applying
exchange operation, the same reasoning has been
de this the pre-eminent system in the large ex-
small exchange dial units are simple and com-
complicated or fragile about them. Being unat-
attention except an occasional visit for routine
hich feature makes them economically feasible for
d be profitless under other methods of operation.

er than the present to look over your own prop-
the future. No matter whether you operate one
Strowger operation will spell profitable operation
ing full information, and our engineers will submit
facts and figures applying to your own particular



Automatic Electric Inc.

Manufacturers of
Strowger Automatic Dial Telephone and Signaling Systems
Factory and General Offices: 1033 West Van Buren St., Chicago, U. S. A.

ASSOCIATED COMPANIES
American Electric Company, Inc., Chicago
International Automatic Telephone Co., Ltd., London
Automatic Telephone Manufacturing Co., Ltd., Liverpool
The New Antwerp Telephone and Electrical Works, Antwerp
Eugene F. Phillips Electrical Works Limited, Montreal

Securing Freedom from Cable Trouble

Some Helpful Suggestions for Securing Freedom from Telephone Man's Bugaboo Cable Trouble—Importance of Periodic Inspection and Accurate Records—Discussion of Causes of Cable Failure; Suggested Methods for Locating Trouble

By R. R. Rex,

Supervisor of Cable Testing, Home Telephone & Telegraph Co., Fort Wayne, Ind.

In the design and construction of a telephone cable plant some consideration should be given to future maintenance problems. This article will not deal with cable distribution, as the amount of flexibility desired is entirely dependent on the area the cable is to serve.

In the designing of the cable plant the area should be gone over carefully with close attention to the proper spacing of poles, as well as location and size of anchors. To lessen future maintenance, the cable should be held as nearly as possible to a grade. Where it is necessary to raise or lower the grade, proper grade clamps should be used.

After the cable has been placed into service, mark a date on your calendar 90 days from this date for your first inspection. This first inspection will no doubt surprise you with the things that later would result in a serious cable failure. Establish a regular routine of inspection for your cable, keeping a record of these inspections as well as a record of each failure, the cause and repairs.

Keep Record of Each Cable's History.

These records eventually supply you with a complete life history of each cable in your plant. On your regular routine inspection you may also clean the terminals and see that the plant men are placing the jumpers in the terminals in the proper manner, and that your cable plant is not being abused by your plant employes or the employes of other public utilities. The years of uninterrupted service will prove how well this preventive maintenance pays.

Some Cause of Cable Failure.

Shorts, crosses and grounds—the common thorns in the side of a plant man—are caused by lightning, open wire coming in contact with high voltage wire, broken down insulation and in some cases, careless work in splicing. A solid cross, short or ground is not difficult to locate.

One of the earlier methods was to connect in series the required number of dry cells, the pair in trouble, a rasp and a screw driver. The helper sat on the floor and scraped the screw driver along the rasp. This produced a fluttering noise in the cable up to the point of the trouble. The splicer, with an exploring coil, usually the armature from a telephone generator, followed the fluttering noise until the trouble was located. A vibrator was later used to take the place of the rasp and screw driver.

From this crude beginning have been developed the several types of fault finders in use today, so that the average plant man with some practice can be successful in the locating of cable trouble, wet trouble due to a break in the sheath from numerous causes, one a bullet hole from the target rifle in the hands of the small boy to the shotgun in the hands of the adult celebrating New Year's Eve or the Fourth of July. It has been my observation that cable failures from this cause are more frequent in the days following these two holidays than any other time of year.

SAFETY DOCTRINES.

By JOHN A. BRACKEN.

Physical Injury.

Physical injury is not an accident; it is the result of the accident.

Every one should learn that the control of accidents must come through being convinced that the hazards of modern telephone practices must be respected; that the stopping of accidents is the efficient and economical way of doing business.

Bullet holes are not difficult to locate for the reason the insulation is broken, and by carefully checking over the pairs in trouble you will invariably find a solid short or cross to work on.

Another cause of cable failure is due to the cracks that appear in a loop or buckle, so it is well, when you make the inspection mentioned before, to eliminate all "loops" or "buckles."

Continue Preventive Maintenance.

While going over your cable hunting for trouble, it is well to continue the preventive maintenance and see that the terminal stubs are properly placed and clamped to the pole with no strain on this clamp. Wet trouble from other causes is no more difficult to locate than any other type of cable trouble.

Of course, you must use good judgment in picking out from 50 to 60 pairs in trouble the ones to which you intend to attach your fault finder. **Be careful and,** above all, do not be in too big a hurry to get out in the field, but remember the greatest number of cases of cable trouble are located in the office by careful testing. This testing can be done with a voltmeter or Wheatstone bridge. If you are not supplied with either, it can be done with a receiver and two dry cells.

I have found it good practice in locating wet trouble not to use the sheath but to pick out the pairs with the least resistance, using about three pairs on each side.

The last of the wet family and the most difficult to locate is the high resistance trouble due to a slight amount of moisture in the cable. This may be due to several causes, one the defective joint. This type of trouble, when caused by a defective joint, does not as a rule appear until the weather has cleared and the sun begins to shine. This loosens the paraffin in the splice and your high resistance trouble appears.

There are several methods in use today for locating this type of cable trouble. One which belongs to the days of the rasp and screw driver is to blow or open splices and test. Another method is to break down the insulation by the application of a direct current. If you have no direct current available, you can secure the desired result by using seven 45-volt B batteries connected in series, which will furnish current enough to break down your trouble. The result is to burn or fuse the wires together, making it possible to locate the trouble as a "cross."

If you have a Wheatstone bridge you may locate your trouble by the Varley loop method, following the usual directions as to loop and connections. This can be done in a simple and easy manner by using the following rule: Use equal bridge arms; one-half the Varley times the feet per ohm of the gauge wire under test, which gives distance in feet from the trouble to the strap.

After the trouble has been located, extreme care must be used in restoring the pairs to service. The sheath is removed well beyond the wet spot. Starting four or five inches back on the cable boil with hot paraffin towards the center of the opening. Continue the boiling until all bubbling has disappeared. Defective insulation at this point will turn black or spotted and must be replaced before closing the opening in the usual manner. It is well to test the pairs with the voltmeter or receiver and dry cells to determine if all moisture has been removed.

Some Causes for Crosstalk.

The result of a wet spot in a cable from which the moisture has not been entirely removed is trouble from inductive inter-

ference, crosstalk, and in some cases cross rings. These troubles may be due to other causes but defective work on trouble repairs is responsible for the greatest amount.

Another cause of crosstalk is the split pair due to splicing the mate of one pair to the mate of another pair. These may be located with the fault finder by placing a short-circuit on the pair in the terminal and noting the splice in which the tone changes volume.

One of the most common causes of crosstalk is cable terminal surface leakage or moisture settling on the face of the terminal. This is where your preventive maintenance comes in. See that all terminal covers are tight as possible. Keep the face of the terminal clean. This can be done with a stiff brush or whisk broom.

In conclusion, again let me call your attention to the routine inspection for your cable plant, and you will find yourself enjoying freedom from that bugaboo cable trouble.

Prices in the Metal Markets.

New York, August 31: Copper—Quiet; electrolytic spot and future, 7½@7¾c. Tin—Steady; spot and nearby, $27.15; future, $27.27. Iron—Quiet; No. 2 f. o. b. eastern Pennsylvania, $15.50@16.50; Buffalo, $15.00@16.00; Alabama, $11.00@13.00. Lead—Steady; spot New York, 4.40c; East St. Louis, 4.22c. Zinc—Steady; East St. Louis spot and future, 3.80c.

ORGANIZATION

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

We sometimes hear folks say, in speaking of certain businesses employing a small, medium, or large number of people, that they lack organization. All of us at some time or other have noted the lack of system or coordination of effort in certain business places. This fact is borne to us, not because of some big failing in the conduct of business, but rather a minor one, such as indifferent service, or other let-down in morale. There is always something wrong with the management when employes render indifferent, disinterested service.

The foregoing suggests the question: "What is organization?" "Any group consisting of parts, each of which performs a special duty," offers someone. "A body of persons united to attain some common end," says another. "Sets or parts working together, regarded as a whole, acting or working together," suggests a third. "To work in orderly fashion," adds another.

Can any company, no matter how small, obtain effective results unless departments and individual employes consider their work as part of a whole or common end, toward which they must all combine and aim their efforts?

What would you think if you saw a group of men at work on the construction of a building, while part of them were tearing down what the others were building?

Have you ever had contacts with employes who tried to shift the responsibility for ineffective service onto other departments or employes? No doubt you formed an unfavorable impression. Customers should not experience the least tremor of lack of coordinated effort in an organization if their confidence is to be maintained.

When we think of effective organization, we picture a set of parts of necessary day-to-day duties performed by employes in an orderly, systematic fashion, whose united effort is directed toward a common purpose.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Southwestern Bell Seeks Permission to Buy Two Properties.

The Southwestern Bell Telephone Co. has applied to the Missouri Public Service Commission for authority to buy the properties of the Ballwin Mutual Telephone Co. for $41,364 and the Creve Coeur Mutual Telephone Co. for $92,068. Both companies operate in St. Louis County, Mo. They are owned by T. L. Leonard, of St. Louis. One company has approximately 400 telephones, and the other, 300.

Company Ordered to Lease Lines for "Wired Music."

Under its legally filed tariffs, the New York Public Service Commission, in a decision issued on August 28, held that the New York Telephone Co. can not refuse, in the exercise of its managerial discretion, to furnish leased lines for the transmission of musical programs from a central point to hotels, restaurants and private residences.

The commission directed the telephone company to furnish certain facilities to "Wired Music," with headquarters at 351 West 52d street, New York City. "Wired Music," an association of persons doing business under that name, applied to the telephone company for the leasing of private lines for transmission purposes with the ultimate intention, if the project is successful, the commission said, to extend the service to other cities and sections which are served by the telephone company.

The telephone company refused the request on the advice of its counsel, stating that "the company is not willing to undertake to furnish a system or network of circuits for such purpose." Wired Music made complaint to the commission and a public hearing was held by it on July 31.

The company alleged that the service was not regular telephone communication and, therefore, not under the jurisdiction of the commission; that although certain facilities are now furnished over leased wires, such service is from surplus facilities and not immediately needed for telephonic communication; that the use of such surplus facilities is in the managerial discretion of the telephone company and that it has the right to decide to how such surplus facilities shall be used.

In announcing the decision, the commission, reviewing the record of the hearing on the complaint of "Wired Music," said:

"It was shown in the record that the telephone company now leases wires over which speeches, musical programs, convention proceedings and other events of general interest are carried from the actual locality to one or more broadcasting radio stations where they are released on the air to be picked up and amplified and reproduced by private or public radio receiver sets.

Exactly the same service, it was shown, was asked by 'Wired Music' so that programs could be sent over leased wires. No equipment is to be supplied by the telephone company at either end and it was also shown that the same service is now given burglar alarm companies, stock exchanges and news tickers and will serve television when commercially feasible.

It was also shown in the evidence that

the telephone company is now using about 200 circuits for radio broadcasting and its witness stated that there does not seem there will be any probable increase over that number. This number, it was contended, was no problem from the standpoint of spare facilities. 'Wired music,' it was claimed, has possibilities of extending to many thousands. The company did not produce any evidence as to the extent of its surplus facilities, stating that they vary in different exchanges."

Commissioner George R. Van Namee, in a memorandum approved by the commission, said:

"The distinction between regular facilities and surplus facilities appears to be an arbitrary distinction made by the company itself for its own purposes. Legally, however, the company has the right under its charter to give 'leased wire service' or it has not.

The company holds that it has this right and it is apparent from the definitions quoted and from sections of the filed tariff of the company that the company itself recognizes all these services and provides a tariff for the same and the method and manner under which the service may be discontinued. By doing so, the company recognizes the service as a part of its regular business. Certainly, the service desired is a form of 'telephonic communication.'

Having taken on this business, it is the duty of the company under section 91 of the public service law to furnish adequate service under just and reasonable charges and to all who apply for the same without unjust discrimination or unreasonable preference.

We cannot sustain the contention of the company that the refusal to furnish leased wires to the applicant is an exercise of its managerial discretion and, therefore, beyond the power of regulation of the commission. The company undoubtedly has the right to make reasonable rules and regulations for the conduct of its business and the commission will not interfere in their enforcement.

The question presented, however, goes far beyond reasonable rules and regulations. It goes to the very essence of the business and to the question of who shall be served by the company. In effect, the company claims the right to say what part of its business it will elect to do.

If the company has no right to do a 'leased wire' business it must stop doing such business with those who have already applied and to whom it has granted these facilities. If this is a legal part of its business, it must come under regulation and the company must serve all who apply under proper conditions for the service.

The company admits it has facilities which it terms 'surplus facilities' and which it has leased to certain customers and that it has filed with this commission a tariff and rules and regulations governing the same. . . . To refuse such facilities to the applicants and to grant them to others is, in the very nature, unjustly discrimnatory and unreasonably preferential.

The company should be ordered to supply the facilities required by the applicants."

Expenses of Michigan Bell Case to Be Conference Discussion.

The Michigan Public Utilities Commission on August 25 asked all persons interested in the case concerning the rates of the Michigan Bell Telephone Co., to attend a conference in Lansing on September 14 for the purpose of "obtaining greater coordination of effort" among the state's expensive experts engaged to aid in the litigation.

The commission's letter was addressed to members of the Michigan League of Municipalities and other parties interested in the efforts extending over a period of several years to force the telephone company to lower its rates.

The commission originally set the conference date for September 9, but postponed it until September 14 because the annual meeting of the Michigan Municipal League will be in progress on the original date. Plans for a more expeditious and less expensive manner of conducting the appraisal will be discussed.

The commission, which went out of office last May, put the work of making the appraisal in the hands of Manfred K. Toeppen and Gerald Wagner, engineers, and Crescent A. Parker, accountant. For conducting the litigation with the Michigan Bell, Harold Goodman, Detroit attorney, was engaged. The compensation paid these four men was from $50 to $100 per day. Engineer Toeppen and Attorney Goodman, a former assistant attorney-general, have been retained by the state, off and on, for several years. Messrs. Wagner and Parker were not engaged until the present appraisal began, February 1.

Between that date and the close of business on August 22, the work of Messrs. Toeppen, Wagner, Parker and their assistants had cost $158,466.27, it is stated. In the same period Attorney Goodman drew $6,360.89.

The letter signed by the five commissioners, Robert H. Dunn, chairman, Kit F. Clardy, Edward T. Fitzgerald, Harry C. McClure and Harold J. Waples, follows in part:

"Since its organization a few weeks ago, the members of this commission have been making a careful study of the present status of the controversy with the Michigan Bell Telephone Co. regarding the question of rates. In doing so, the commission has been actuated by a desire to bring the case to a successful conclusion without unnecessary delay.

In making arrangements our predecessors on the commission presumably expected that the services of these gentlemen would not be continuous over the period required in the successful prosecution of the state's case. However, our investigation of the cost sheets has disclosed that the experts in question have been putting in full and continuous time.

Moreover our investigation has led us to the belief that the three-way inquiry by the experts is not being conducted along any comprehensive, coordinated plan. In fact, there is evidence that disagreement exists among the state's experts regarding the procedure being followed.

It is the belief of this commission that a successful carrying out of the state's case necessitates the immediate coordination of these activities. It also may be deemed advisable to curtail some of these activities with a view to shortening the case.

We are further of the opinion that the per diem plan of compensation should be discontinued and a new arrangement provided for without delay on a flat salary basis if this can be done without in any way lessening the effectiveness of the state's position. Before taking these important steps, however, we desire your judgment and advice."

Lower telephone rates were ordered by the Michigan Public Utilities Commission in 1926. The telephone company obtained a temporary restraining order from the federal court in Detroit and the matter has been in litigation ever since.

Temporary Rural Rate for Grounded Service at Whitewater, Kans.

Effective this month at Whitewater, Kans., the Kansas Telephone Co. has announced a temporary grounded rate of $1.50 for rural service.

This is not a lowering of rates, as was indicated in TELEPHONY of August 29, but covers a change in the type of service. The $2.00 rate for rural metallic service still stands.

Illinois Bell Pays Chicago Quarterly Franchise Compensation.

A. R. Bone, secretary and treasurer of the Illinois Bell Telephone Co., on August 29 handed to the city comptroller of Chicago, Ill., the company's check for $497,300.74, representing 3 per cent of the gross operating revenues of the company for service rendered in the city of Chicago for the calendar quarter ended June 30, as provided for in the ordinance recently passed.

The first payment under the new ordinance was made by the company on August 6 and totaled $4,759,709.26, covering the compensation for the period from January 8, 1929, to March 31, 1931. These payments will be made regularly hereafter, covering each quarter and within 60 days of the end of the quarter, under provisions of the new ordinance.

(*Please turn to page* 45.)

)ut-of-town Service

FOR THE HOME

THE home telephone is such a familiar instrument that its full range of service is frequently forgotten.

To show women, particularly, the ease and economy of out-of-town calls, advertisements like the two on the opposite page are appearing regularly in a number of women's publications.

These advertisements are planned to show the human side of residence toll service—to picture it as the friendly, useful sort of servant that it is. They indicate appropriate occasions for its use—when weddings or anniversaries occur, when friends move to other cities, when children are away at school or on vacation.

The essence of these advertisements is in their natural, conversational sub-captions. Each is a little incident out of the day's existence, planned to catch the pleasant warmth of a human voice, carried across the miles, and clearly suggest that "talking is next best to seeing." The rest of the text briefly develops the central situation and includes a list of toll charges for various distances to prove low cost.

Readable advertising of this kind is reaching millions of women each month—and its effect should be felt by the entire telephone industry—both Bell and connecting companies.

Advertisement of the American Telephone and Telegraph Company

At the Head of Wall Street, New York

Wall Street, New York, Where Buildings Like Stock Prices Alternately Go Up and Down, Presents a Scene of Unusual Telephone Activity—This Article Tells About a P-A-X Installation in the Newest Wall Street Skyscraper

By Elmer I. Campbell

"New York," as the wag from the West invariably says, "will be a great city if they ever get it finished."

For the wag's information let it be known that at least one small segment of the metropolis is finished—the southeast corner of Wall Street and Broadway where now stands the 50-story headquarters building of the Irving Trust Co. The interest that this building holds for readers of TELEPHONY is two-fold. In the first place the bank's quarters contain a complete Strowger P-A-X system; in the second, it is a building whose foundations rest on one of New York's most historic sites.

Only three other buildings have ever stood at the southeast corner of Wall Street and Broadway. The first was the farmhouse built by sturdy Johannes Nevius nearly 300 years ago, when the tiny settlement on the lower end of Manhattan was the recently founded Dutch trading post of New Amsterdam. The farmhouse stood at a point where an Indian trail passed through the "Wall" or palisade, which, extending from river to river, fixed the northern limit of the settlement.

From such vantage points as Murray Hill and Central Park the not very kindly disposed Manhattees Indians sent smoke signals to fellow savages nearer the "Wall," with the result that straying cows often lost their good homes!

The one thousand men, women and children who comprised the population of Manhattan at that time, needed few facilities for communication. Letters to the folks at home were carried by sailing vessels. The burghers themselves met at church at least once a week and communication was principally by word of mouth.

The Irving Trust Co. Building at One Wall Street, New York, 50 Stories High, Is the Fourth Building to Occupy the Site.

The names of the streets of the settlement are still to be found in lower Manhattan. "De Heere stratt" (the principal street) was changed in 1677 to Broadway. "Lang de Wall" became Wall Street in 1695 and "De Maagde Padje" (The Maid's Path) is now Maiden Lane.

The home that Johannes Nevius erected on this site was "built solidly and for permanence. No doubt the gable end of his house stood to the street, because this was the rule. It had two small windows, each of two panes of glass, the usual size of the glass being six by eight inches.

"An inventory of his household furniture would disclose andirons, a skillet, gridiron, pewter and brass candlesticks, pewter plates and dishes, tongs and shovels, spit, tankard, a few Turkey-worked chairs and some plain chairs, a stool or two, a looking glass, but no carpets. Of course, there was a sideboard with a few imported liquors and these not adulterated.

The floors and doorstills were scrupulously clean, for every Dutch wife worked hard from early morn till sunset, chiefly in scouring and polishing." By no stretch of her imagination could Adriaentje, who was Johannes' wife, contemplate a day when a 50-story house would rise in place of hers. A house that would require scores of workers to keep clean!

The Second Building.

In the early days of the 19th century, 165 years after the Nevius farmhouse was built, the property was sold for more than $18,000 to a tailor who agreed to erect thereon "a good, substantial dwelling of three or more stories in which there should never be sold wines, nor animals slaughtered, nor anything else noxious or offensive to neighboring inhabitants." Prob-

The Central Watch-Room. Here a Sub-Switchboard Provides Night, Sunday and Holiday Service. The Panel at the Left Contains a Loudspeaker, Wired to Microphones in the Safe Deposit Vaults—The Combined Out-of-Town and Foreign Offices on the Sixth Floor of the Irving Trust Co. Building at One Wall Street.

ably this building was protected by a lightning-rod and certainly iron nails were used in its construction, for the nail machine had been perfected in 1787.

During the 165 years which marked the life of the first building at One Wall Street, the population of Manhattan increased from 1,000 to more than 60,000. The steamboat had been added to New York's means of communication during this time and the second building, used at first as a dwelling and later for business purposes, witnessed the birth of the telegraph and the telephone.

Washington Irving, who, in 1851, returned to New York from Spain, where he had been Minister from the United States, gave his name to the first Irving bank. Little did he realize as he sat in his brother's law office at 3 Wall Street writing his famous "Knickerbocker History of New York," that some day, on that very site, the bank to which he had given his name would erect a skyscraper, to be known as the "Irving" building.

The Third Building.

In 1898 the owner of One Wall Street received an offer of $400,000 for the property, which afterward was withdrawn. When asked to name his price, the owner is said to have offered to sell for the equivalent of enough silver dollars to cover the plot. Another version of the story says five-dollar gold pieces. The offer was accepted so promptly that the

A Monophone on Each Floor of the Three-Story Vault Provides Quick Communication with Officers in All Parts of the Building.

owner was startled and is said to have withdrawn by declaring that he meant the coins should be stood on edge, not laid flat down.

After the owner's death the property was sold to a group of men from St. Louis who erected the 18-story "Chimney Corner," long noted because of its peculiar structure as one of the architectural oddities of New York.

The Fourth Building.

The Irving Trust Co. building fronts on Wall Street and extends southward 178 feet on both Broadway and New street. Its ground area is nearly 20,000 square feet and the building has 736,000 square feet of floor space in all.

On the second floor on the east side of the building is the switchroom where the heart of the P-A-X system is located. To serve the bank's intercommunication needs there are 600 stations of the monophone type. From the "C" basement, 78 feet below the level of Broadway, to the 50th floor, 654 feet above Broadway, are P-A-X instruments on all floors occupied by the Irving Trust Co. Practically every worker's desk, from the chairman of the board to the ubiquitous office boy, is equipped with a Strowger monophone.

The switchroom equipment consists of 16 line finders, providing 8 per cent trunking and 54 connectors—nine connectors per 100 lines. The racks are installed back to back and the terminal frame, taking the place of a main frame, is attached to the wall and enclosed in a cabinet. Space in the racks and terminal frame has been allowed for a growth of 33⅓ per cent. The line relay racks are equipped with relays for 200 lines and each line is equipped with a line and cut-off relay.

Seven 100-pair cables terminating on the frame feed the building from top to bottom. Generally speaking each cable serves two floors. From the 10th to the 46th floor the building is occupied by tenants other than the Trust company.

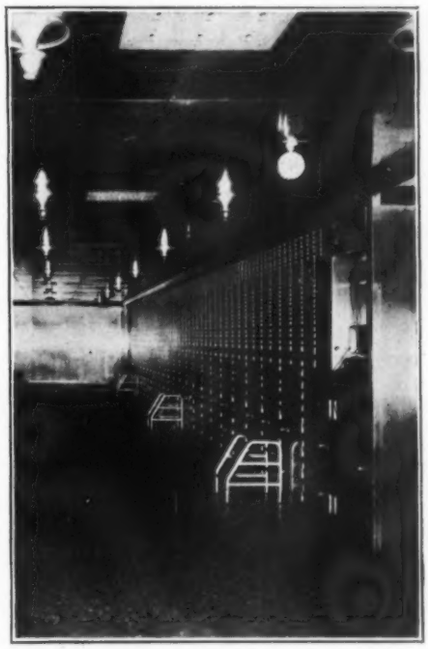
The power board is equipped with two rotary converter ringing machines, two Tungars and associated fuse and indicator equipment. During periods of heavy traffic there is a discharge of 12 to 15 amperes. The board is fed from two sets of Philco Drynamic batteries, 23 batteries to a set. While one set is discharging the other is charging.

The system handles a daily average of 6,000 calls. The heaviest load comes from 3:30 to 4.30 o'clock in the afternoon when the hourly rate reaches the 1,200 mark.

As part of the bank's protective system there is a P-A-X station in each of the three vaults. There is also a watchman's recording system providing for night signals from 18 stations located in various parts of the building.

Each of the 29 elevators is equipped with a wall set mounted in a cabinet imbedded in the elevator wall. These instruments provide communication between the starters and the elevator operators and, when necessary, provide communication between the operators and any station in the building.

For example, part of the protective system includes an electric locking device,



The Interior of the Vault, Showing the Recessed Shelf Where the Telephone Instruments Are Located. Note the Microphone in the Ceiling. This Is Part of the Bank's Protective System.

which, in case of emergency, such as hold-up or robbery, locks every bank elevator in its shaft, thus controlling access to and exit from the elevators. In such an emergency the supervisor of the bank's central watchroom could call each elevator operator and learn the location of his car and the names of his passengers.

The Irving Trust Co., which prior to its removal to One Wall Street had its headquarters in the Woolworth Building, has been a P-A-X user for many years. The satisfactory degree of service given by the P-A-X system in the Woolworth Building headquarters was a deciding factor in the selection of similar equipment for the new headquarters building.

W. Portney is in charge of the Irving Trust Co. P-A-X system at One Wall Street.

Latest Telephone Coin Box Racket in New York City.

A 21-year-old news dealer in New York City was recently held in $1,000 bail by Magistrate Burke in West Side Court for trial in special session on a charge of petty larceny.

Two investigators for the New York Telephone Co. testified they saw him stuff tissue paper in the return slot of a coin telephone at Forty-fifth street and Broadway. He returned two hours later, they said, and took four marked nickels which they had placed there.

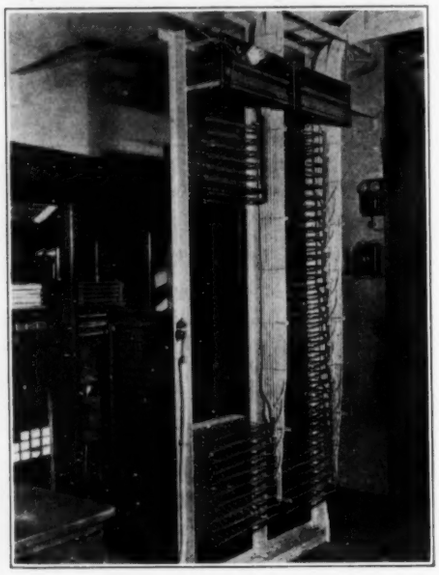
Magistrate Burke remarked that he nearly lost 10 cents in a coin-box booth. The coin was returned by the operator, he said, but did not drop down the slot. He inserted his finger, found it stuffed with paper and recovered the money.

Missouri Town Now Common Battery

From Single Circuit System in Late '90s Bethany, Mo., Has Progressed to System of 800 Local Subscribers Who Are Now Provided With Modern Common Battery Service—Story of System's Development and Recent Rebuilding

By E. R. Sears,
Representative, Kellogg Switchboard & Supply Co.

Bethany, county seat of Harrison county, is situated in the rich farming country of northwest Missouri. Hard-surfaced highways lead in four directions out of Bethany and the amount of concrete paving within the city is equal to any town of its size in Missouri. The town is laid out on a square with the court house in the center.



Rear View of the Bethany Switchboard Showing Arrangement of Partition with Relay Rack in Foreground.

It is illuminated with a modern white way lighting system that adds considerably to its beauty. The cleanliness of the city, its large shade trees and beautiful residences, serve to indicate the progressive type of people in Bethany.

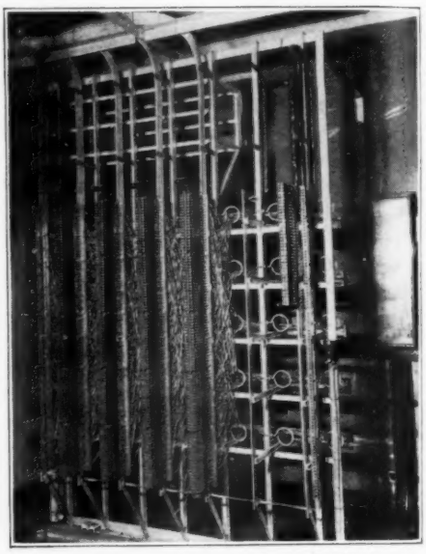
In the late 90's the first telephone system, a single circuit, connected Bethany to neighboring towns in the county. Since that time the increasing use of the telephone in social and business life has enabled the system to prosper and grow rapidly. From the original single circuit, the telephone company has expanded to a system with 800 subscribers in Bethany alone.

J. C. Ray purchased the original exchange in 1904 and operated it successfully. In 1915 he reconstructed the entire system to better meet the needs of the growing locality. A new telephone building was erected and the outside plant was rebuilt. To complete the improvement plan, a Kellogg three-position, 600-line magneto switchboard was installed.

Later the company was purchased by the Middle States Utilities Co., of Plattsburg, Mo. At this time it was still a magneto exchange, but soon after it was taken over by the Middle States Utility Co., a comprehensive study was made to establish the advisability of converting the system to common battery.

The results of the study definitely established the need for common battery service to assure the company a profitable return on its investment as well as to enable it to give the service that a growing, progressive community needed and wanted. Immediately plans were made for changing the equipment.

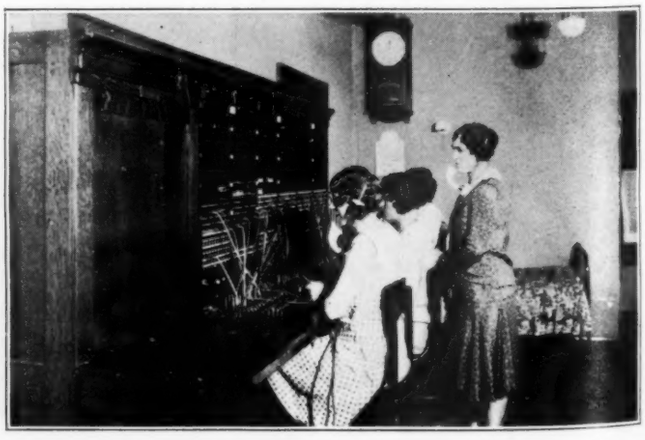
Work began at once on the outside plant. All aerial construction was removed from streets and the entire town was cabled. Previously the city square had been obstructed and made unsightly by a network of wires. After the underground cabling was completed, poles and wires were removed, and the square was greatly improved in appearance. This single item alone created immeasurable good will for the company and helped considerably in securing the increased rates for common battery service.



Main Frame Equipment in the Bethany, Mo., Exchange of the Middle States Utilities Co. Picturing Neat Job of Installing and Wiring.

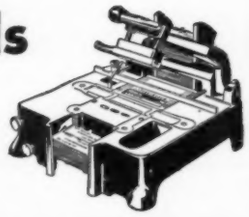
The telephone building was remodeled and rearranged to accommodate new central office equipment. To conserve floor space and to give the exchange building a neat appearance, the switchboard was placed in the partition separating the operating and terminal rooms.

The six-panel, three-position Kellogg common battery multiple switchboard installed is wired for an ultimate capacity of



Remodeled Exchange Building at Bethany, Mo., of the Middle States Utilities Co.—Kellogg Common Battery Multiple Switchboard Recently Installed in the Bethany Office.

ADDRESSOGRAPH
does more
. . than handle telephone bills



Small Addressographs operate at speeds from 500 to 1,800 impressions an hour. Print through a ribbon. Prices from $20 to $264.75, f. o. b. Factory.

FOR reducing the expense of imprinting subscribers' bills with name, address, date, rate, etc., hundreds of telephone companies consider Addressograph indispensable.

Yet this is only one of the many operations Addressograph performs. The same economies it effects in your billing, it will also effect in the imprinting of countless forms used in record keeping, collecting, disbursing, routing, repairing, in the stockroom, and in the shop.

Electric and Automatic Addressographs—print through a ribbon—speeds from 2,000 to 12,000 impressions an hour. Electric machines $295 to $870—automatic machines $595 to $12,750, f. o. b. Factory.

And the way Addressograph simplifies the whole job of getting out mailings makes it invaluable in building business and getting more subscribers.

Let the Addressograph representative in your locality show you exactly how with Addressograph you can both reduce expense and build business. There is no obligation.

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General Offices: 1814 E. 40th St., Cleveland, Ohio
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Addressograph
TRADE MARK
PRINTS FROM TYPE

RECOGNIZED

The World Over for Its

QUALITY

LONG LIFE

DEPENDABILITY

Burgess, the famous black and white striped batteries, are always on the job—in the navy, the signal corps and with the Byrd Antarctic Expedition.

Business Telephone Batteries too, are known the world over for their dependability—ready to give instant and intermittent service over a long period of time.

BURGESS BATTERY COMPANY
General Offices: CHICAGO
NEW YORK CHICAGO SAN FRANCISCO
IN CANADA: NIAGARA FALLS AND WINNIPEG

1,200 lines. Position No. 1 is arranged for toll lines, No. 2 for rural and local lines and No. 3 for local lines. At the same time, Kellogg common battery telephones were purchased to replace all the magneto sets.

The entire installation was under the supervision of W. H. Liddle, Jr., equipment engineer.

M. L. Golladay, at the time general manager, and John Cline, his chief engineer, are largely responsible for the great improvement made at Bethany and for the efficient manner in which the construction work was carried on.

Reconstruction Program of Lincoln (Neb.) T. & T. Co.

Reconstruction and extension plans of the Lincoln (Neb.) Telephone & Telegraph Co. call for removal of more than 1,259 miles of long distance wire; also the substitution of newer equipment which improves voice transmission qualities and which is protected from the elements and other factors so that interruption is now almost impossible.

These are, in part, replacements of wires that have lost their service usefulness, changes in pole lines made necessary alterations in state highways and include instances where additional lines cannot be accommodated on the existing pole lines.

With the Manufacturers and Jobbers

Large Order for Wyckoff Conduit Placed by Pennsylvania.

The Wyckoff Pipe & Creosoting Co., of New York City, has received an order for all of the wooden conduit for the new electrification of the Pennsylvania Railroad, which consists of the building of an electric line from Washington, D. C., to Boston, Mass. Part of this work has been completed. Plans are now under way for the construction of 108 miles of line in the immediate future.

An order has been placed with the Wyckoff company for two-thirds of the cover boards to be creosoted and delivered at different points. The Pennsylvania Railroad's specifications call for 10 lbs. of oil per cubic feet of lumber in all of the cover boards. About half a million feet of cover boards, 1½ ins. by 12 ins., will be included in this order, as well as a good many thousand feet of Wyckoff conduit.

The Pennsylvania's engineers have great faith in the conduit and creosoting of the Wyckoff company, Wyckoff conduit laid 40 years ago for that railroad showing no signs of decay. In rebuilding the Baltimore tunnel Wyckoff creosoted ties put in place 32 years were found by the contractor to be without any signs of decay.

The Wyckoff Pipe & Creosoting Co. is the oldest manufacturer of creosoted wood conduit for underground transmission wires. In 1884 Frank T. Wyckoff, president of the company, invented and patented creosoted wood conduit. Since that time it has sold more than 11,000 miles of Wyckoff conduit.

Stromberg-Carlson Equipment Installed in Indiana Exchange.

By C. F. Sanders,
Sales Engineer, Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

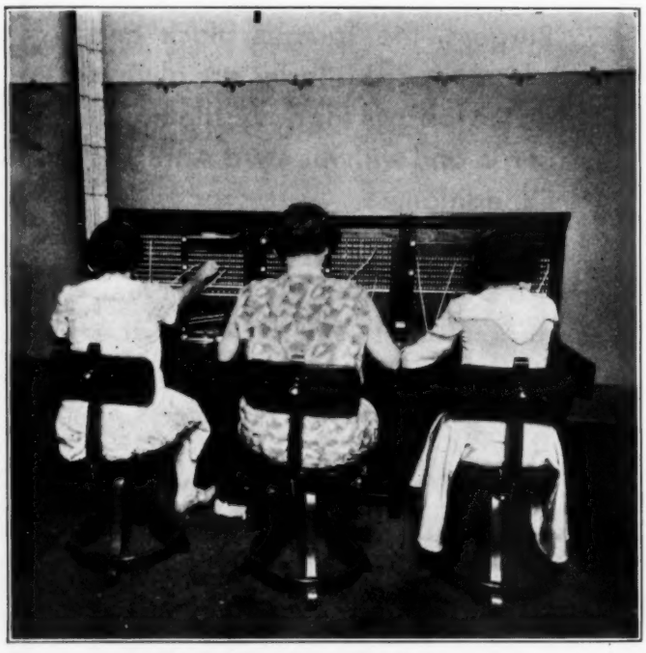
The city of Flora, located in Carroll county, Ind., with a population of 2,000, was one of the first Indiana communities to be settled. It was named after Abraham Flora, one of a group of early settlers who migrated to Indiana from Pennsylvania. Today this town is the center of a prosperous community surrounded by improved farms that are owned and operated by the descendants of the original settlers.

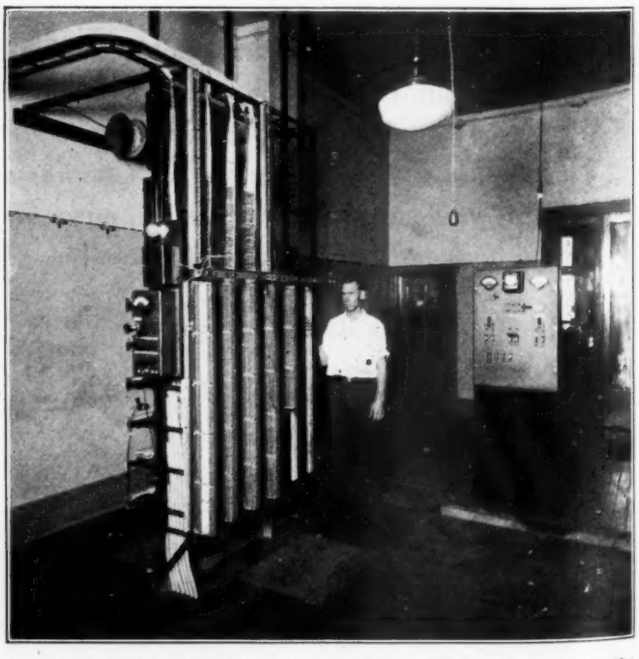
The town boasts of a number of thriving industries among which is a large branch plant of the Indiana Condensed Milk Co. where the nationally-advertised brand of Wilson condensed milk is made. Local business men own and operate a large poultry and egg plant which does an annual business of more than $2,000,000. Its trucks collect poultry and eggs from the farms of many counties.

A three-position Stromberg-Carlson junior multiple switchboard was installed at Flora recently. This new equipment has provided Flora and the surrounding community with rapid and efficient telephone service and has been a great asset in carrying on the business of this community.

The management at Flora is under the direction of F. M. Lantz. C. B. Dwyer is general plant manager; M. D. McCracken, plant man; Mrs. Lucille Clingenpeel, cashier, and Miss Clara Wagoner, assistant cashier.

The positions of the junior multiple switchboard consist of high efficiency uni-





Operators at Work Putting Up and Taking Down Connections on the New Three-Position Junior Multiple Switchboard Recently Installed at Flora, Ind.—View of Main Distributing Frame and Power Panel in the Flora Exchange.

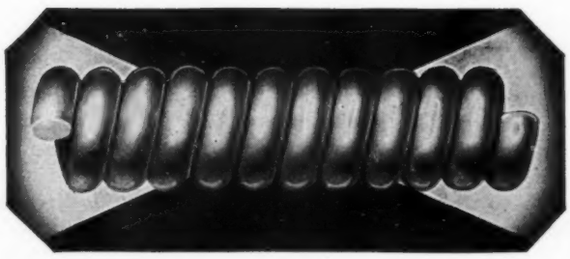
Year In and Year Out

EXIDE Chloride Batteries have served the telephone industry in every kind of service. There is no other battery like it. Its famous Manchester Positive and Box Negative plates assure dependability and long, useful life. Its unique design and careful construction minimize maintenance requirements, promote freedom from trouble and assure economical operation.

You can *depend* on Exides. They are especially built to comply with every requirement of telephone service. When you specify Exides your operating dollars will go farther.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia, Pa.



Galvanized Telephone Wire and Steel Strand

Crapo Galvanized Wire can be wrapped around its own diameter without injury to its pure zinc coating....That is one of a number of reasons why **Crapo** Galvanized Telephone Wire and Strand can be depended upon to reduce maintenance cost.

Look for the **Crapo** Seal!

Indiana Steel & Wire Co.
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Avoid Death by Evaporation

An ordinary Battery will die of old age without putting a single volt of potential into the circuit. Evaporation through a leaky roof and soldered joints does the damage.

Storm King Duro Powr Telephone Batteries can't evaporate. Nothing gets through their seamless one-piece cold drawn zinc cups and nothing gets out of the specially processed top seal.

After four years aging on the shelf, Storm King Batteries gave full rating on laboratory tests.

Reduce your Battery maintenance expense by using Storm King age-proof Telephone Cells.

GENERAL DRY BATTERIES
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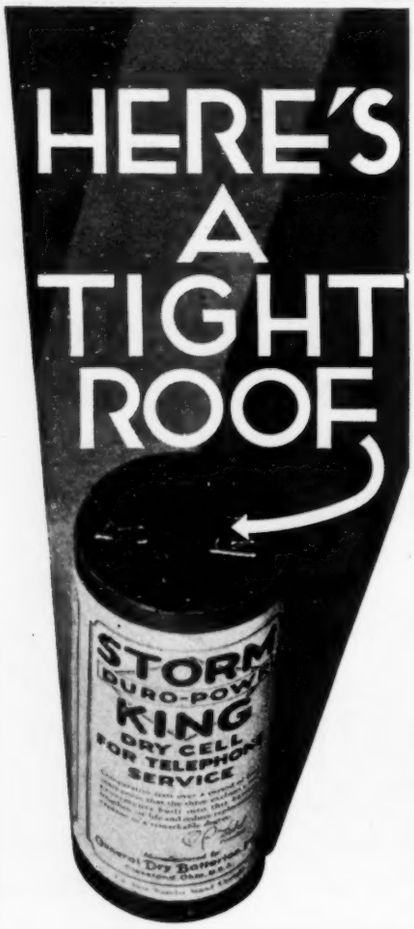
Makers of all types of dependable Dry Batteries for Radio, Ignition, Flashlight and General Use.



versal cord circuits. These provide for bridge manual listening, ringing on either answering or calling cord, audible busy test, repeating coils in each circuit to insure maximum efficiency with minimum noise from inductive disturbances; non-ring repeating coils in cord circuits, which eliminates confusion as subscribers "ring-off" does not pass through the cord circuit to the connected line; double supervisory signals, automatic adaption to the line in which the plug is inserted precludes any necessity of particular cord selection and generator cut-off on calling cord.

The operator's telephone circuit provides for modern features among which are anti-side tone qualities, common monitoring key and duplicate cut-in jack.

U. S. Signal Corps Orders Six American Electric Switchboards.

The Signal Corps procurement district of Chicago has awarded American Electric Co., Inc., State at 64th street, Chicago, a contract for six common battery switchboards totaling 18 operators' positions. One of these units has been ordered for stock while the balance has been assigned as follows:

For Mitchell Field, Mineola, Garden City, N. Y., one common battery switchboard consisting of three unit operator positions, one calculagraph section and one cable-turning section; to be equipped with 300 lines, 48 pairs of cords and 20 trunks.

For Selfridge Field, Mt. Clemens, Mich., one common battery switchboard consisting of three unit operators positions, one calculagraph section, one cable-turning section; to be equipped with 300 lines, 48 pairs of cords and 20 trunks.

For Maxwell Field, Montgomery, Ala., one common battery switchboard consisting of three unit operator positions, one calculagraph section and one cable-turning section; to be equipped with 400 lines, 48 pairs of cords and 20 trunks.

For Ft. McPherson, Ga., one common battery switchboard consisting of three unit operator positions, one calculagraph section and one cable-turning section; to be equipped with 300 lines, 48 pairs of cords and 20 trunks.

For Fort Benjamin Harrison, Ind., one common battery switchboard consisting of three unit operator positions, one calculagraph section and one cable-turning section; to be equipped with 300 lines, 48 pairs of cords and 20 trunks.

Company Recommends New Way of Setting Untreated Poles.

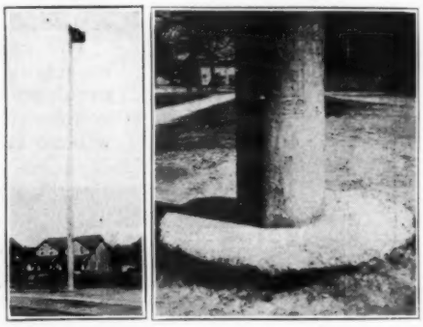
Making poles last is a problem that every user would like to have solved. Virginia white cedar poles have been used along the Atlantic coast for many years, and some of them have shown a life of 25 years or more untreated.

The flag pole, shown in the accompanying illustration, was furnished and erected in Norfolk, Va., by the Jordan Bros. Lumber Co. and has stood for over 20 years. No butt treatment was used on this pole, and it is said to be as straight and in as good condition as when first set.

Of particular interest is the method used in setting this pole. It includes a concrete slab about 4 inches thick and about 18 inches wide around the base of the pole at the ground line. This slab originally cost less than one dollar and serves a twofold purpose: It has the effect of a mushroom brace for the pole and prevents water running down the pole from settling at the base and causing rot to set in at the ground line.

This pole was bored with a test auger a few months ago, and showed perfectly sound through to the center.

Virginia white cedar contains an oil which makes it impervious to creosote. A white cedar log placed in a creosoting cylinder with pine or other woods shows no penetration of oil under pressure, although the pine will show penetration



Flag Pole Found in Perfect Condition at Ground Line After 22 Years—Close-up View of Pole's Concrete Ring at Ground Line.

entirely through the log. It is claimed that this natural oil in Virginia white cedar gives it a great advantage over other woods.

Jordan Bros. Lumber Co., Norfolk, Va., specializes in poles of Virginia white cedar, carrying over 10,000 of them in its storage yard at Corapeake Junction, Va.

This cedar comes from an original grant made to George Washington, and grows around Lake Drummond in the Dismal Swamp of Virginia, made famous by Thomas Moore's poem, "The Lake in the Dismal Swamp."

By a peculiar condition of nature, this swamp, although only 25 miles from Norfolk, is about 23 feet above sea level. A hard rim of earth surrounds the swamp and holds in the water of the lake, which is a clear amber color, taken from the roots of the trees.

In olden days this water was used on sailing vessels going out of Norfolk, as it contains a preservative coming from the cedar roots that keeps the water fresh for several months.

Full particulars concerning Virginia white cedar telephone poles may be obtained from the Jordan Bros. Lumber Co., Norfolk, Va.

It should be understood that the galvanometer merely indicates that the arms of the bridge are balanced. The resistance connected to the X arm can be found in terms of the reading of R and the multiplying factor of the ratio. As the multiplying factors of the ratio dial are multiples of 10 the answer can be read directly from the dial readings by shifting the decimal point.

Fault Location by Straight Resistance Tests.

In the location of cable faults due to metallic short-circuits, or crosses between the conductors, where the fault itself is thought to have zero resistance, an accurate location can be obtained by merely measuring the loop resistance out to the short. The distance to the short-circuit can then be computed by multiplying one-half the loop resistance to the fault by the "feet per ohm" value for the particular cable involved. (See Table No. 1 for table of cable resistance equivalents.)

A somewhat more accurate method of converting the measured resistance to distance is to measure the loop resistance of a good pair (with a strap at end terminal) in the same cable and divide the value obtained into the length of cable from tester to strap to get the number of feet per ohm. This eliminates error due to the temperature being higher or lower than 68° Fahrenheit, used for Table No. 1.

After the resistance to the short-circuit or cross is measured, it is always advisable to make sure that the fault resistance is zero. This can be easily done by placing a strap at the end terminal on the two conductors which are short-circuited, and making another resistance measurement. If this measurement is lower than the first one, then the fault has an appreciable resistance, and the straight resistance method cannot be used. Fig. 3-B illustrates this method.

In making straight resistance measurements the unknown resistance is connected to terminals X_1 and X_2 of the bridge. The key is thrown to "Resistance." The ratio dial is set on the value recommended for the range in which the unknown resistance is thought to fall. The battery and galvanometer keys are closed momentarily and the direction in which the indicator needle moves is noted.

The rheostat dials are then adjusted so as to either cut resistance in or out of the R arm, until a balance is obtained. This will be indicated by no movement of the galvanometer needle when the keys are closed. The value of resistance cut into the rheostat should then be read from the dial settings and multiplied by the ratio dial setting. For example: If a balance is obtained with 1,300 ohms in the rheostat arm and with the ratio arm set on .1, then the unknown resistance connected to terminals X_1 and X_2, is $X = AR$, or $X = .1 \times 1{,}300$ or 130 ohms.

Most cable faults result from moisture trouble and even with metallic short-circuits or crosses, the resistance of the fault is seldom zero. For this reason the straight resistance measurement is seldom reliable in locating faults, and is mentioned here merely to give an understanding of the procedure in making straight resistance measurements.

Cable Fault Location by Loop Methods.

The accurate and recommended method of locating cable faults is by means of so-called "loop tests." These tests are based on so connecting the Wheatstone bridge that the conductors on each side of the fault are connected in the R and X bridge arms, while the fault is utilized to feed battery to the two arms. The fault resistance, being in the

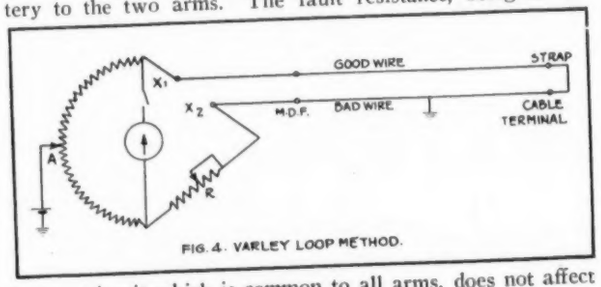


FIG. 4. VARLEY LOOP METHOD.

battery circuit which is common to all arms, does not affect the accuracy of the readings obtained.

A good wire is utilized to loop the bad wire back to the bridge. The bridge is balanced by adjusting the variable resistance arms, so that the relation $X = AB/R$ or $X = AR$ is obtained.

Figs. 4 and 5 illustrate the two loop methods which are in general use for location of cable and open-wire faults in telephone plants. These two methods are known as the Varley and Murray loops. They both give the same answer, although obtaining it in different ways.

Referring to Fig. 4, which shows the Varley method as connected for locating a ground, it will be noted that the bad wire is strapped to a good wire at the distant terminal and that the resistance of all of the good wire and a portion of the bad wire is included in the X arm of the bridge. The portion of the bad wire between tester and fault is in series with the R arm of the bridge.

In Fig. 5, which shows the Murray method as connected for locating a ground, it will be noted that the B arm is short-circuited and is replaced by the rheostat. The X arm consists of the good wire and the bad wire from strap to

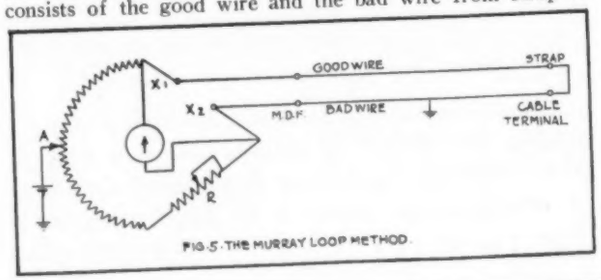


FIG. 5. THE MURRAY LOOP METHOD.

fault, while the R arm consists of the bad wire from tester to fault. The bridge is balanced by varying the rheostat which replaces the B arm.

It is evident that the relation $X = AB/R$ or $X = AR$ can be satisfied by varying the ratio arms, A and B, with the X and R arms constant. In order to avoid becoming confused, it is best to think of the B arm as being replaced by one which is variable from 0 to 10,110 ohms, rather than to think of it as being replaced by the R arm.

As to which is the better method to use, it is difficult to say; some advocate one method and some the other. Both, in the writer's opinion, are equally good. If a bridge is available which permits readily shifting from one arrangement to the other, it is a good plan to make the initial measurement with the Varley and then check this location with the Murray.

The Varley Loop Method.

The Varley loop method is useful in locating grounds, short-circuits or crosses. Accurate results can be obtained even with fault resistances as high as 100,000 ohms.

Inasmuch as most testing is for ground faults due to moisture trouble, the illustrations that follow show ground

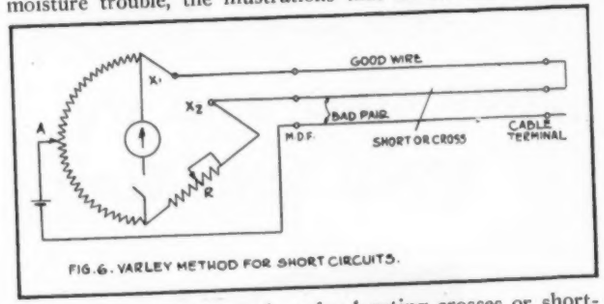


FIG. 6. VARLEY METHOD FOR SHORT CIRCUITS.

fault set-ups. The procedure for locating crosses or short-circuits is identical except that one of the short-circuited or crossed conductors is used as the battery return, Fig. 6.

In the description of the Varley and Murray loop methods, the same practical example is used to explain each method, so that a good understanding of the various methods can be obtained by a careful comparison of the examples. The example consists of locating a fault on a mile of No. 22 gauge cable. The fault is one-half mile from the office main distributing frame.

There are two arrangements of the Varley loop which may be used. The first one to be described is the simpler. On short cables (one mile or less) and in connection with trouble not due to sheath breaks, it will generally be satisfactory. It *cannot be used*, however, where the good wire is not the same gauge and length as the bad wire. The following steps indicate a desirable procedure to follow in locating cable faults, especially in connection with "moisture."

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MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices not previously published.

CHESTNUT POLE TIMBER

Eight-page bulletin describing specifications, treating methods and general information regarding chestnut poles. **American Forest Products Co., Inc., 122 East 42nd Street, New York City, N. Y.**

MAGNETO EQUIPMENT

New 72-page general catalog prepared expressly for magneto exchanges. It completely covers all necessary equipment, apparatus, and supplies for magneto plants. **Kellogg Switchboard & Supply Company, 1066 West Adams Street, Chicago, Ill.**

TELEPHONE SUPPLIES

Condensed price list No. 637 applying to catalog No. 91, gives new prices of Kellogg switchboards, telephones, apparatus and supplies. **Kellogg Switchboard & Supply Company, 1066 West Adams Street, Chicago, Ill.**

Notices previously published.

CREOSOTED PINE POLES

A sixteen-page booklet listing the cities in the United States that use creosoted pine poles on business and residential streets. Illustrated and contains interesting information on the reduction of bleeding.

RINGING CONVERTERS

Bulletin No. 150 entitled "Leich Ringing Converters" describes and illustrates converter equipment for producing ringing current; this includes harmonic converters, ringing frequency converters and ringing converters with charger equipment. **Leich Electric Co., Genoa, Ill.**

SALES CAMPAIGNS

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SWITCHBOARDS (P-A-X's)

The Strowger Type 31 P-A-X provides facilities for handling trunk calls at any station, thus eliminating the attendant's cabinet. It is described in an illustrated circular, which has just come off the press. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

TELEPHONES

Bulletin 1034, a completely revised and enlarged catalog of Strowger Dial Telephones and Telephone Parts, both for central battery and for local battery service. Among the new items included are pay stations, the Strowger Telephone Call Recorder, and the filter coil unit for eliminating radio interference from subscribers' dials. **Automatic Electric Inc., 1033 W. Van Buren St., Chicago, Ill.**

WOOD POLE SPECIFICATIONS

A special folder has been prepared showing the specifications and dimensions for western red cedar, northern white cedar, southern pine and chestnut poles approved by American Standards Association under the sponsorship of the A. S. A. Telephone Group (Bell Telephone System and United States Independent Telephone Association.)

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Answers to Traffic Questions Presented on Page 19.

1. If a subscriber asks you to hurry or rush a call, enter the word "rush" in the "Special Instruction" space. If he gives a reason for wishing the call rushed, enter this information in the "Special Instruction" space, following the word "rush."
2. For the sake of uniformity, it is intended that whenever a circuit is built up between the originating toll center and the terminating toll center, the originating toll center shall be responsible for its clearance. The originating toll center operator is responsible for the verbal clearance of a toll circuit which she has used in connection with an outward call, regardless of whether or not she built up the circuit. However, if a circuit is built up to your office by an intermediate operator for the purpose of reporting on an "NC" call order, but is released without being used to establish a through switch, you are not responsible for clearing the circuit.
3. When you pass a call to your toll center and she gives you an "NC" report and does not ask you to hold the trunk and the calling number, she should permit you to use the circuit if your filing time takes precedence.
4. If the calling party requests that no report except "WH" be given, you may comply with his request. If the customer indicates that he does not wish to pay a report charge on the call, it will be necessary to explain to him that complying with his request in not giving him a report will not eliminate the report charge on the call if a chargeable report is received.
5. In selecting a girl for telephone work, the following qualifications are most essential:
   a. Age, preferably 17 to 25.
   b. Intelligence.
   c. Education (8th grade) two years or more high school preferable.
   d. Good health, sight, hearing and voice.
   e. Consider size, reach and temperament.
   f. Character, personality, disposition and appearance.

WHAT THE COURTS AND COMMISSIONS ARE DOING

(*Continued from page 32.*)

Summary of Commission Rulings and Schedule of Hearings.

CALIFORNIA.

August 25: The Interstate Telegraph Co., of Bishop, authorized to issue and sell on or before December 31, 1931, at not less than par and accrued interest, $96,000 of 6 per cent first mortgage gold bonds, due March 1, 1937, and to use the proceeds to pay outstanding indebtedness.

MASSACHUSETTS.

September 23: Hearing resumed in the matter of the investigation into the rates and charges of the New England Telephone & Telegraph Co.

MINNESOTA.

August 19: An amendment approved to the order of the commission approving the sale of the St. Paul properties of the Tri-State Telephone & Telegraph Co. to the Northwestern Bell Telephone Co. The codicil specified that the change in rate structure set forth in the order shall not block a final determination of rates on the basis of valuation of telephone properties.

September 11: Hearing in Goodhue on complaint of Reverend E. S. deCourcy, relative to being placed on a certain line and unsatisfactory telephone service furnished by the G. O. Miller Telephone Co.

September 14: Hearing in St. Paul on complaint of the Leslie Rural Co-Operative Telephone Association, of Long Prairie, against the Northwestern Bell Telephone Co., of Minneapolis, requesting removal of one certain toll pay station recently installed by the Northwestern Bell company at Round Prairie.

MISSOURI.

August 17: Application filed by Julia Webmeyer for permission to sell the telephone exchange at Rosebud to Minnie Bumpass.

August 17: Application filed by J. A. Bays for permission to operate the telephone exchange at Pleasant Hope, which he purchased from H. L. Wilson January 15, 1929.

August 26: Southwestern Bell Telephone Co. applied for authority to purchase the properties of the Ballwin Mutual Telephone Co. and the Creve Coeur Mutual Telephone Co.

NEBRASKA.

August 22: Application filed by the Northwestern Bell Telephone Co. of Omaha for authority to revise the boundaries of its base rate area at its Sidney exchange, found reasonable and order issued granting request.

August 22: Complaint filed by C. L. Scroepel and others asking that the Basset-Springview Telephone Co. be ordered to furnish reasonable, adequate and proper service at reasonable rates at its Bassett exchange.

August 24: In the matter of the application of the Hamilton County Farmers Telephone Association for authority to collect and publish a flat rate for service, from Doniphan to Grand Island, and also from Phillips to Grand Island, it is ordered that the association be authorized to collect $1.65 a quarter in advance for service between Doniphan and Grand Island and 99 cents a quarter in advance, Phillips to Grand Island.

August 24: In the matter of the application of the Lincoln Telephone and Telegraph Co. for authority to offer to its subscribers at exchanges other than the Lincoln exchange, service known as semi-public service at a rate of 50 cents per month below the established rate for business party service at the exchanges where such semi-public service is requested and furnished; found reasonable and desirable, and authority issued as asked, the rate in no case to exceed $4.00 per month.

August 26: Application filed by the Citizens Telephone Corp., of Blair, asking for authority to issue $57,000 worth of 5 per cent bonds; it appearing that these are for purely refunding purposes and will effect a saving in interest charges, authority granted as requested.

August 26: In the matter of the application of the Union Telephone Co., of Carroll, for authority to publish and collect increased rates at its Carroll ex-

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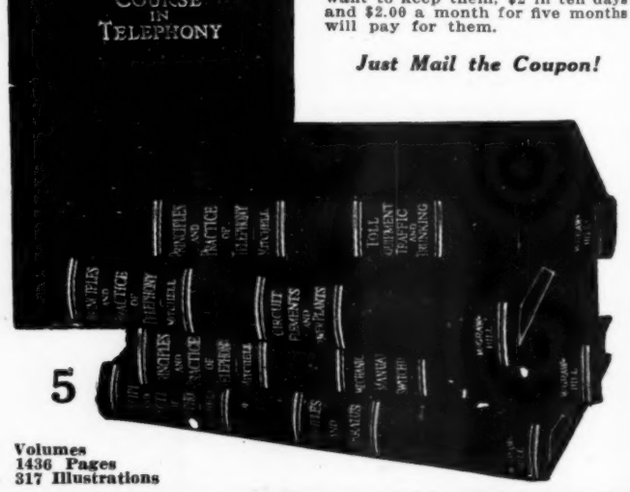

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change; found reasonable and authority granted as asked. The company was also authorized to publish and collect a 25-cent monthly rate additional for desksets.

August 29: In the matter of the application of the Southeast Telephone Co., of Falls City, for validation of certain regular and special rates inadvertently put into effect without commission approval; ordered that as rates published are reasonable and of the same general level as collected in like exchanges, request be granted as asked.

NEW YORK.

August 28: Hearing in Hornell on the proceeding as to the service provided by the Howard-Hornell Telephone Co. upon motion of the commission.

August 28: New York Telephone Co. directed to furnish certain facilities to Wired Music, of New York City, for the transmission of musical programs from a central point to hotels, restaurants, and private residences. The company already had elected to provide such service to radio broadcasting systems, and therefore, could not refuse to perform the same service for other companies, the commission held.

OHIO.

August 14: Petitions filed by the Ohio Cities Telephone Co., the Ohio Associated Telephone Co., and the Freeport Telephone Co. for permission to revise their current rate schedules to establish a code governing installation and maintenance of semi-public telephone service.

The proposed schedules, according to the commission, cover the conditions under which service will be installed, establish a five-cent charge for local messages, and prescribe guaranteed minimum revenues.

The Ohio Cities Telephone Co. also asked the commission to approve a supplement to its local exchange tariffs for all exchanges, establishing a five-cent charge for calls by non-subscribers.

September 28: Hearing of protests on the Ohio Cities Telephone Co. rate increase applicable to Dover and New Philadelphia.

The controversy arose over the question of valuation of the telephone company's plant in Dover. The company claims a valuation of $956,830 and the commission engineers place the valuation at $807,764.

OKLAHOMA.

September 1: Hearing on application of the Western Telephone Co. for authority to discontinue service at Pernell.

September 11: Hearing on petition filed by Mayor A. W. Scott, of Holdenville, asking a state investigation of telephone rates at Holdenville.

A new $300,000 telephone building at Holdenville was erected recently by the Southwestern Bell Telephone Co. Commission records show that the Holdenville city council at that time agreed to an increase in rates to $4 monthly for business lines, and $2 for party lines.

PENNSYLVANIA.

August 20: Complaint filed by W. A. Koockengey, of Titusville, against Pennsylvania Telephone Corp. protesting 10-cent report charge on toll call.

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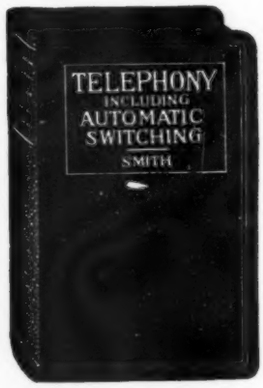

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